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Pursuant to §45-14-17.2

PRELIMINARY DETERMINATION/FACT SHEET

for the

Construction

of

Pleasants Energy, LLC's
Waverly Power Plant

located in

Waverly, Pleasants County, WV.

Permit Number: R14-0034
Facility Identification Number: 073-00022

Date: September 29, 2016

Entire Document
NON-CONFIDENTIAL

BACKGROUND INFORMATION

Application No.:	R14-0034
Plant ID No.:	073-00022
Applicant:	Pleasants Energy, LLC
Facility Name:	Waverly Power Plant
Location:	Pleasants County
NAICS Code:	221112
Application Type:	PSD Major Construction
Received Date:	September 18, 2015
Engineer Assigned:	Steven R. Pursley, PE
Fee Amount:	$11,000
Date Received:	September 21, 2015
Complete Date:	April 18, 2016
Due Date:	October 14, 2016
Applicant Ad Date:	September 26, 2015
Newspaper:	*Pleasants County Leader*
UTM's:	Easting: 468.63 km Northing: 4,353.57 km Zone: 17

On November 29, 1999 Pleasants Energy, LLC submitted a permit application to construct a 300 MW, natural gas fired, simple cycle peaking power facility near Waverly, WV (Pleasants County). The plant included two General Electric (GE) 7FA class simple cycle combustion turbines, each nominally rated at 167.8 MW (while firing natural gas at an ambient temperature of 59° F and 60% relative humidity) including generator, exciter, and associated auxiliary mechanical and electrical systems. The primary fuel was natural gas, and low sulfur distillate fuel oil was to be the backup fuel. The electrical output tied directly into the Allegheny Power transmission system which is located on the property.

The original 1999 application proposed limiting emissions from the facility to less than 250 tons per year of each criteria pollutant in order to avoid constructing a "major" source per 45CSR14 and thereby undergoing PSD review procedures. The resulting permit (R13-2373) limited annual criteria pollutant emissions to the following:

Pollutant	TPY
Oxides of Nitrogen	241
Sulfur Dioxide	53
PM-10	75
Volatile Organic Compounds	12
Carbon Monoxide	116

The permit made those limits practically enforceable primarily by limiting the amount of fuel which could be consumed by the turbines and requiring Pleasants Energy to install and operate a Continuous Emissions Monitoring System (CEMS) for NO_x. Construction of the facility was completed and the plant began operating in 2001.

On September 18, 2015, Pleasants Energy submitted an application to modify the facility. Specifically, Pleasants wishes to increase the permitted amount of fuel which can be combusted by the facility. This modification results in emissions from the facility increasing over the major source threshold of 250 tons per year of both NO_x and CO. Per 40 CFR 52.21(r)(4);

"At such time that a particular source or modification becomes a major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification otherwise to emit a pollutant, such as a restriction on hours of operation, then the requirements or paragraphs (j) through (s) of this section shall apply to the source or modification as though construction had not yet commenced on the source or modification."

Therefore, the application submitted by Pleasants Energy on September 18, 2015, will be subject to all requirements of PSD review.

Emission sources associated with the permit are:

* Two General Electric (GE) Model 7FA simple cycle combustion turbines (CTs).

The potential emissions of Carbon Monoxide (CO), and Oxides of Nitrogen (NO_x), are above the "major source" thresholds that require the application to be reviewed under the Prevention of Significant Deterioration (PSD) program administered in WV under 45CSR14. Emissions of PM, PM_{10} and $PM_{2.5}$ are less than PSD major source thresholds but above PSD significance thresholds. Therefore they will also be reviewed under the PSD program. The emission rates of VOC's, Sulfur Dioxide (SO_2), Lead (Pb) and Sulfuric Acid Mist (H_2SO_4) are below the "significance" threshold and, therefore, the application will also be concurrently reviewed under the WV minor source program administered under 45CSR13.

The following document will outline the DAQ's preliminary determination that the construction of the Pleasants Energy, LLC facility will meet the emission limitations and conditions set forth in the DRAFT permit and will comply with all current applicable state and federal air quality rules and standards.

PUBLIC REVIEW PROCEDURES

Public review procedures for a new major construction application dual-reviewed under 45CSR13 and 45CSR14 require action items at the time of application submission and at the time a draft permit is prepared by the DAQ. The following details compliance with the statutory and accepted procedures for public notification with respect to permit application R14-0034.

Actions Taken at Application Submission

Pursuant to §45-13-8.3 and §45-14-17.1, Pleasants Energy, LLC placed a Class I legal advertisement in the following newspaper on the specified date notifying the public of the submission of a permit application:

- *The Pleasants County Leader* (September 26, 2015)

A link to the electronic copy of the application was sent to the following organizations:

- The U.S Environmental Protection Agency - Region 3 (July 12, 2016)
- The National Park Service (October 7, 2015)

- The US Forest Service (October 7, 2015)

The application was also available at the DAQ Headquarters in Charleston (Kanawha City) for review.

Actions Taken at Completion of Preliminary Determination

Pursuant to §45-13-8.5 and §45-14-17.4, upon completion (and approval) of the preliminary determination and draft permit, a Class 1 legal advertisement will be placed in the following newspapers stating the DAQ's preliminary determination regarding R14-0034:

- *The Pleasants County Leader*

A copy of the preliminary determination and draft permit shall be forwarded to EPA Region 3. Pursuant to §45-13-8.7, copies of the application, complete file, preliminary determination and draft permit shall be available for public review during the public comment period at the WVDEP Headquarters in Charleston. Further, the U.S. Forest Service and the National Park Service will receive copies of the preliminary determination and draft permit upon request. All other requests by interested parties for information relating to permit application R14-0034 shall be provided upon request. Additionally, the preliminary determination and draft permit will be posted on WVDAQ's webpage.

A public meeting to accept written and oral comments concerning the preliminary determination and draft permit may take place on a date to be determined at the time the public notice is published (at the Directors discretion).

Actions Taken at Completion of Final Determination

Pursuant to §45-14-17.7, and 17.8 upon reaching a final determination concerning R14-0034, the DAQ shall make such determination available for review at WVDEP Headquarters in Charleston.

DESCRIPTION OF PROPOSED FACILITY

Pleasants Energy plans to increase the hours of operation of its two simple-cycle GE-7FA combustion turbines at the Pleasants Energy facility located near Waverly, West Virginia. The facility is located in Pleasants County, which is currently designated as attainment/unclassified for all criteria pollutants.

The existing Pleasants Energy facility is a 300 MW simple cycle electric generating peaking stations. The facility includes two GE 7FA simple cycle combustion turbines each rated at 167.8 MW (natural gas, 59°F, 60% humidity). The turbines primary fuel is natural gas but low sulfur distillate fuel oil is utilized as a backup fuel. In 2015, Pleasants equipped each turbine with a TurboPhase system that injects externally supplied air into the combustion turbine after compressor discharge at the inlet to the combustor. This increases air mass flow through the turbines and, consequently, generator output.

In the event of a catastrophic blackout, the Pleasants facility can supply power to the grid which would provide the necessary power to allow other, larger, power plants to restart. To provide this capability, Pleasants Energy must be able to startup from "black start" conditions. Therefore, in 2014 Pleasants installed five (5) diesel-fired Caterpillar Model C175-16 4,376 brake-horsepower (bhp) reciprocating internal combustion engine (RICE) paired with a 3 MW generator. Pleasants existing permit limited each generator to 500 hours of operation per year. This limit will be retained in the PSD permit.

The facility also has a fuel oil storage tank on site which is considered de minimis per 45CSR13 Table 45-13B item 58.

Each combustion turbine has its own exhaust stack. Each stack is 114.5 feet above grade.

SITE INSPECTION

On July 13, 2016 the writer conducted a site inspection of the location of the Pleasants Energy, LLC plant. The following observations were made during the inspection:

- The site of the plant is located less than one mile east of Waverly, WV but in Pleasants County, WV.
- The power generation facility lies just south of State Route 2. The plant is very close to other industrial and commercial facilities.
- The general topography of the area is a river valley (approximately 1 mile wide). Ground level of the site will be approximately 630 feet above sea level. The surrounding mountains rise to over 900 feet above sea level. Stack height will be approximately 180 feet above ground level.
- The following pictures were taken the day of the site inspection:


Emissions from the F-Class combustion turbines are dependent on the ambient temperature conditions and the turbine's operating load, which can vary from 60 percent to 100 percent and 100 percent load with TurboPhase operation. To account for representative seasonal climatic variations, potential emissions from the proposed combustion turbines were analyzed at 60 and 100 percent load conditions as well as 100 percent load with TurboPhase for ambient temperatures ranging from negative (-)10 degrees Fahrenheit (°F) to 100 °F. Projected emissions were based on data provided by GE for the 7FA combustion turbine and information from the TurboPhase vendor, as well as AP-42 emission factors.

The permit will require testing/CEMs to confirm compliance with the emission rates.

Table 2: Steady State Turbine Emission Factor Source (natural gas operation/per turbine)

Pollutant	Emission Rate	Emission Factor Source	Comments
CO	9 ppm	BACT	32 lb/hr w/o TurboPhase (TP) 36 lb/hr w/ TurboPhase
NO_x	9 ppm	BACT	65 lb/hr w/o TP 75 lb/hr w/ TP Includes Low NO_x Burners
PM	15 lb/hr w/o TP 17.2 lb/hr w/ TP	Stack Testing on same model & generation of Turbines	Includes both filterable and condensable PM
PM_{10}			
$PM_{2.5}$			
SO_2	2.5 lb/hr w/o TP 2.8 lb/hr w/ TP	Mass Balance	
VOCs	3.0 lb/hr w/o TP 3.4 lb/hr w/ TP	Manufacturer	
GHGs	183,961 lb/hr w/o TP 212,291 lb/hr w/ TP	AP-42 & 40 CFR 98 Subpart A	CO_{2e} Basis
H_2SO_4	0.38 lb/hr w/o TP 0.44 lb/hr w/TP	Mass Balance	Assumes 10% of SO_2 & 100% of SO_3 is converted to H_2SO_4
HAPs	0.77 b/hr	AP-42	

Table 3: Steady State Turbine Emission Factor Source (fuel oil operation w/TP/per turbine)

Pollutant	Emission Rate	Emission Factor Source	Comments
CO	20 ppm	BACT	72 lb/hr
NO_x	42 ppm	BACT	470 lb/hr
PM	39 lb/hr	Vendor Data	Includes both filterable and condensable PM
PM_{10}			
$PM_{2.5}$			
SO_2	103 lb/hr	Mass Balance	
VOCs	8 lb/hr	Vendor Data	
GHGs	256,873 lb/hr	AP-42 & 40 CFR 98 Subpart A	CO_{2e} Basis
H_2SO_4	15.8 lb/hr	Mass Balance	Assumes 10% of SO_2 & 100% of SO_3 is converted to H_2SO_4
HAPs	2.00 lb/hr	AP-42	

Start-Up and Shut-Down Emissions

Each combustion turbine may start up to 365 times per year which may include up to 20 starts on fuel oil. For natural gas combustion, potential start-up and shut-down emissions were based on a start-up profile and conservatively assumed that there would be up to 365 cold start-ups and 365 shut-down events per turbine per year on natural gas. One start-up and shut-down event is equivalent to one start-up (0 percent load to when the turbine is in "Mode 6", which is approximately 60 percent load or minimum load for steady state operation and emissions compliance) plus one shut-down (60 percent load or minimum load for steady state operation and emissions compliance to 0 percent load). Start-up is assumed to take 120 minutes while shut-down shall take 60 minutes for a total of 180 minutes for one start-up and shut-down event.

Potential fuel oil start-up and shut-down emissions were based on a start-up profile and conservatively assumed that there would be 20 cold start-ups and 20 shut-down events per turbine per year on fuel oil. One fuel oil start-up and shut-down event is equivalent to one start-up (0 percent load to when the turbine is in "Mode 6", which is approximately 80 percent load or minimum load for steady state operation and emissions compliance) plus one shut-down (80 percent load or minimum load for steady state operation and emissions compliance to 0 percent load).

Table 4: Start-Up & Shut-down Turbine Emissions (natural gas operation/per turbine)

Pollutant	Start-Up Emission Rate (lb/hr)	Shut-Down Emission Rate (lb/hr)	Total Emissions Per Event (lbs)
CO	384.4	144.4	913.2
NO_x	121.2	103.3	345.7
PM	15.0	15.0	45.0
PM_{10}			
$PM_{2.5}$			
SO_2	2.50	2.50	7.5
VOCs	6.80	6.20	19.8
GHGs	183,961	183,771	551,313
H_2SO_4	0.38	0.38	1.14

Table 5: Start-Up & Shut-down Turbine Emissions (fuel oil operation/per turbine)

Pollutant	Start-Up Emission Rate (lb/hr)	Shut-Down Emission Rate (lb/hr)	Total Emissions Per Event (lbs)
CO	230.4	195.7	656.5
NO_x	561.6	543.1	1,666.3
PM	39.0	39.0	117.0
PM_{10}			
$PM_{2.5}$			
SO_2	103.0	103.0	309.0
VOCs	9.10	9.0	27.2
GHGs	256,873	255,995	767,985
Lead	0.02	0.02	0.06
H_2SO_4	15.8	15.8	47.4

Annual turbine emissions (two turbines combined) are based on the maximum of each pollutant under several different operating scenarios.

Table 6: Maximum Annual Turbine Emissions:

Pollutant	Annual Emission Rate (tpy)
CO	509.54
NO_x	464.60
PM	100.10
PM_{10}	
$PM_{2.5}$	
SO_2	39.03
VOCs	23.84
GHGs	1,231,632.52
Lead	0.01
H_2SO_4	6.02

The turbines are the only equipment being modified in this permitting action. However, as explained below under Regulatory Applicability, emissions from the rest of the facility must be examined to make sure that they should not also undergo PSD review.

TurboPhase Engines

Each of the two turbines is connected to TurboPhase system. Each TurboPhase system consists of four 2,750 hp spark ignition, natural gas fired engines. The TurboPhase system injects externally supplied air into the combustion turbine after compressor discharge at the inlet to the combustor.

Estimates of NO_x, CO, PM, and VOC emissions from the TurboPhase engines are based on vendor data. SO_2 emissions are based on AP-42 Section 3.4. Greenhouse gasses are based on 40 CFR Part 98. Annual emissions are based on each engine operating 3,250 hours per year. This limitation is included in their existing permit and will be folded in to the new PSD permit.

Table 7: Maximum TurboPhase Engine Emissions.

Source	CO		NO_x		VOCs		$PM/PM_{10}/PM_{2.5}$		SO_2	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TP engines[1]	5.34	8.66	24.26	39.4	1.46	2.36	1.60	2.60	0.08	0.12

[1]Both TurboPhase systems (all 8 engines) combined.

Blackstart Generators

The maximum potential-to-emit (PTE) from Pleasant Energy's emergency generators is summarized in the table below. Emissions were based on the applicable NSPS limits, (NOx, NMHC, CO and PM) and on factors obtained from AP-42, Section 3.4 (VOCs, SO_2 and HAPs). Fuel consumption was based on information provided by the vendor and a fuel heat content of 137,000 Btu/gal was used in the calculations. The existing permit limits the facility to 500 hours per year of operation per engine. The new permit will retain this limit.

Table 8: Maximum Blackstart Generator Emissions (Per Engine)

Pollutant	Emission Factor	Source	Hourly (lb/hr)	Annual (ton/yr)
CO	2.61 g/bhp-hr	Subpart IIII	25.18	6.29
NO_X	0.50 g/bhp-hr	Subpart IIII	4.82	1.21
NMHC	0.3 g/bhp-hr	Subpart IIII	2.89	0.73
$PM/PM_{10}/PM_{2.5}$	0.07 g/bhp-hr	Subpart IIII	0.72	0.18
SO_2[1]	0.0000121 lb/hp-hr	AP-42, Table 3.4-1	0.05	0.02
VOCs	0.000642 lb/hp-hr	AP-42, Table 3.4-1	2.88	0.72
Total HAPs	0.0045 lb/mmbtu[(3)]	AP-42, Table 3.4-3	0.13	0.04

(1) Based on 15 ppm sulfur
(2) Based on TOCs being 91% Non methane (see footnote f of table 3.4-1)
(3) Sum of all HAPs in AP-42Tables 3.4-3 & 3.4-4

Table 9: Maximum Blackstart Generator Emissions (All five Engines combined)

Pollutant	Hourly (lb/hr)	Annual (ton/yr)
CO	125.90	31.47
NO_X	24.10	6.03
NMHC	14.39	3.60
$PM/PM_{10}/PM_{2.5}$	3.60	0.90
SO_2[1]	0.27	0.07
VOCs	14.39	3.60
Total HAPs	0.04	0.17

Emissions from the existing facility are taken directly from the engineering evaluation for R13-2373B.

Table 10: Existing Emissions from the Facility

Source[1]	CO	NO_x	VOCs	$PM/PM_{10}/PM_{2.5}$	SO_2
	tpy	tpy	tpy	tpy	tpy
Turbines	116.0	241.0	12.0	75.0	53.0
TP engines	8.66	39.4	2.36	2.60	0.12
Generators	31.47	6.03	3.60	0.90	0.07
Total	**156.13**	**286.43**	**17.96**	**78.5**	**53.19**

[1]Two turbines combined, 8 TurboPhase engines combined and 5 generators combined.

Comparing Table 10 and Table 1 give the increase in emissions due to this modification.

Table 11: Increase in Emissions

CO	NO_x	VOCs	$PM/PM_{10}/PM_{2.5}$	SO_2
tpy	tpy	tpy	tpy	tpy
393.57	223.57	11.84	25.1	-13.99

It should be noted that SO_2 emissions decrease because the existing permit contains an indirect fuel oil limit (it contains a direct natural gas limit which is reduced for each gallon of fuel oil used thus resulting in an indirect fuel oil limit) of 15,770,000 gallons per year. The new permit will contain an explicit fuel oil limit of 4,205,357 gallons per year for both turbines combined (as per the permit application).

Total HAP emissions from the modified facility will be as shown in Table 12 (all emissions based on AP-42 except for natural gas formaldehyde emissions from the combustion turbines which are based on the 08/21/2001 Roy Sims EPA Memo). Emissions are based on the turbines burning the maximum permitted amount of natural gas because that scenario results in the highest total HAP emissions.

Table 12: Facility Wide HAP Emissions

Pollutant	Turbines		Generators		TurboPhase Engines		Total	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
2,2,4-Trimethylpentane	--	--	--	--	0.02	0.03	0.02	0.03
Acetaldedyde	0.13	0.39	--	--	0.57	0.92	0.70	1.31
Acrolein	0.02	0.06	--	--	0.35	0.57	0.37	0.63
Benzene	0.04	0.12	0.11	0.03	0.03	0.05	0.18	0.20
Biphenyl	--	--	--	--	0.01	0.02	0.01	0.02
1,3-Butadiene	--	--	--	--	0.02	0.03	0.02	0.03
Ethyl Benzene	0.10	0.31	--	--	--	--	0.10	0.31
Formaldehyde	0.64	2.00	0.01	0.01	3.60	5.83	4.25	7.84
Hexane	--	--	--	--	0.08	0.12	0.08	0.12
Methanol	--	--	--	--	0.17	0.28	0.17	0.28
Naphthalene	0.01	0.01	0.02	0.01	--	--	0.03	0.02
PAHs	0.01	0.02	--	--	--	--	0.01	0.02
Propylene	--	--	0.40	0.10	--	--	0.40	0.10
Toluene	0.40	1.30	0.04	0.01	0.03	0.05	0.47	1.36
Xylene	0.20	0.62	0.03	0.01	0.01	0.02	0.24	0.65
Total	1.55	4.83	0.61	0.16	4.89	7.94	**7.05**	**12.92**

DAQ Review of Emissions Methodology

All emission factors and calculation methodologies were deemed appropriate. With the use of CEMS and compliance testing, the ultimate validity of the emission factors will be tested repeatedly on a periodic post-issuance basis.

REGULATORY APPLICABILITY

The Pleasants Energy, LLC facility is subject to a variety of substantive state and federal air quality rules and regulations. They are as follows: 45CSR13, 45CSR14, 45CSR16, 45CSR30, 45CSR33, 45CSR34, 40 CFR 60 - Subpart GG, 40 CFR 60 Subpart III, 40 CFR 60 Subpart JJJJ and 40 CFR 63 - Subpart ZZZZ. It should be noted that Subparts IIII (emergency generators), Subpart JJJJ (turbophase engines) and Subpart ZZZZ (generators and turbophase engines) apply to equipment that is not being effected by this modification. Those rules were addressed in previous permitting actions and therefore will not be addressed here.

Each applicable rule, and Pleasants proposed compliance thereto, will be discussed in detail below. Additionally, those rules that have questionable applicability but do not apply will also be discussed.

WV State-Implementation-Program (SIP) Regulations

45CSR2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers. *(Not Applicable)*

The combustion turbines themselves do not meet the definition of "fuel burning unit" because they do not produce power through *indirect heat transfer*.

45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides *(Not Applicable)*

The combustion turbines themselves do not meet the definition of "fuel burning unit" because they do not produce power through *indirect heat transfer*.

45CSR13: Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

The modification of the Pleasants Energy, LLC Plant is defined as a construction of a major source under 45CSR14. The project will be either major or "significant" as defined in 45CSR14 for all criteria pollutants (and Greenhouse Gasses) with the exception of VOCs and SO_2. Therefore, the proposed VOC and SO_2 emissions will be permitted under Rule 13.

As required under §45-13-8.3, Pleasants Energy, LLC placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is . . .

located." The ad ran on September 26, 2015 in the *Pleasants County Leader* and the affidavit of publication for this legal advertisement was submitted on October 8, 2015.

<u>45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration</u>

45CSR14 sets the requirements for new construction of "major stationary sources" (as defined under §45-14-2.43) of air pollution, on a pollutant-by-pollutant basis, in areas that are in attainment with the National Ambient Air Quality Standards (NAAQS). Pursuant to §45-14-7.1, PSD review additionally applies to each pollutant proposed to be emitted in "significant" (as defined under §45-14-2.74) amounts. Although the Pleasants Energy, LLC facility is an existing source it will treated as the construction of a new major stationary source Per 40 CFR 52.21(r)(4);

"At such time that a particular source or modification becomes a major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification otherwise to emit a pollutant, such as a restriction on hours of operation, then the requirements or paragraphs (j) through (s) of this section shall apply to the source or modification as though construction had not yet commenced on the source or modification."

The facility is located in Pleasants County, WV, which is classified as in attainment with all NAAQS. The modification of the facility is defined as a construction of a "major stationary source" under 45CSR14 (see above) and PSD review is required for the pollutants of CO, NO_x, $PM_{2.5}$, PM_{10}, TSP, and Greenhouse Gasses (see Table 6). Note that the major source threshold for simple cycle gas fired turbines is 250 tons per year. Therefore emission of both CO and NO_x classify the facility as "major". Additionally, since the facility is considered a major source, emissions exceeding 25 tpy, 15 tpy and 10 tpy of PM, PM_{10} and $PM_{2.5}$ respectively subject those pollutants to PSD review since the are defined as "significant". The substantive requirements of a PSD review includes a best available control technology (BACT) analysis, a modeling analysis, and an additional impacts analysis; each of these will be discussed in detail under the section <u>PSD REVIEW REQUIREMENTS</u>.

It is important to note that only the combustion turbines are undergoing PSD review under 45CSR14. This is because if we look back at the additions of, 1) the black start generators and 2) the TurboPhase engines, we can see that neither project would have triggered PSD review even if it was assumed that the facility had been an existing major stationary source.

Specifically, installation of the generators increased emissions as follows:

Table 13: Generator Emissions (all 5 engines combined, per G60C-067)

Pollutant	PSD Sig. Threshold	Annual (ton/yr)	PSD (Y/N)
CO	100 tpy	31.47	N
NO_X	40 tpy	6.03	N
PM	25.00	0.90	N
PM_{10}	15.00	0.90	N
$PM_{2.5}$	10.00	0.90	N
VOCs	40.00	3.60	N
SO_2	40.00	0.07	N
GHG's (CO_{2e})	75,000.00	5,850.00	N

Similarly, installation of the TurboPhase engines increased emissions as follows:

Table 14: TurboPhase Engine Emissions (all 8 engines combined, per R13-2373B)

Pollutant	PSD Sig. Threshold	Annual (ton/yr)	PSD (Y/N)
CO	100 tpy	8.66	N
NO_X	40 tpy	39.40	N
PM	25.00	2.60	N
PM_{10}	15.00	2.60	N
$PM_{2.5}$	10.00	2.60	N
VOCs	40.00	2.36	N
SO_2	40.00	0.12	N
GHG's (CO_{2e})	75,000.00	25,879.00	N

<u>45CSR16: Standards of Performance for New Stationary Sources</u>

45CSR16 incorporates by reference applicable requirements under 40 CFR 60. 40 CFR 60 Subpart GG applies to the facility (see below under Federal Regulations).

45CSR30: Requirements for Operating Permits

45CSR30 provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act. The Pleasants Energy, LLC facility is subject to the requirements Title V and changes authorized by this permitting action must also be incorporated into the facility's Title V operating permit. Commencement of the operations authorized by this permit shall be determined by the appropriate timing limitations associated with Title V permit revisions per 45CSR30.

45CSR33: Acid Rain Provisions and Permits

45CSR33 incorporates by reference applicable requirements under 40 CFR 72-77. The proposed combustion turbines will be subject to the Acid Rain Program including emissions standards (40 CFR 72.9), monitoring requirements (40 CFR 75) and permitting provisions (40 CFR 72.3).

FEDERAL REGULATIONS

40 CFR 60, Subpart GG: Standards of Performance for Stationary Gas Turbines

Subpart GG of 40 CFR 60 establishes limits for NO_x and SO_2 emissions from stationary gas-fired turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour (10MMBTU/hr), based on the lower heating value of the fuel fired. The Pleasants Energy Project turbines will each have a heat input (fuel flow) of approximately 1, 571 MMBTU per hour at 59° F at full load, making each turbine subject to the requirements of Subpart GG as per 40 CFR 60.330. Subpart GG contains emission standards (for NO_x and SO_2) in addition to notification, monitoring and testing requirements. The applicable standard limiting the discharge of NOx into the atmosphere from each turbine is expressed as:

$$STD = 0.0075^* (14.4/Y) + F$$

where:

STD = allowable NOx emissions (percent volume at 15 percent oxygen and on a dry basis)

Y = manufacturer's rated heat rate at manufacturers rated load (kilojoules per watt hour) or, actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not to exceed 14.4 kilojoules per watt hour.

F = NO_x emission allowance for fuel-bound nitrogen as defined in paragraph (a)(3) of this section.

The heat input rate for each of the GE 7FA turbines on natural gas firing is 9.87 kJ/W-hr at 100% load and 59° F. Therefore, the NSPS limitation for NO_x is 109 ppmvd at 15% oxygen. The anticipated emission rate for the Pleasants Energy Project turbines is 9.0 ppmvd at 15% O_2 while combusting natural gas and 42 ppmvd at 15% O_2 when combusting fuel oil both of which are well below the NSPS emission limit for NO_x. The emissions limit set forth in the permit will be more stringent than the limit specified under the NSPS.

Under the Subpart GG NSPS, SO_2 is limited to 0.015% SO_2 by volume (150 ppmvd corrected to 15 percent O_2), and fuel oil sulfur content is limited to less than 0.8 percent by weight. The Pleasants Energy, LLC facility will meet these criteria by using natural gas as the primary fuel source. The facility has a current permit limit of 0.5 grains per 100 scf which is approximately 8 ppmvd. Further, the distillate fuel oil is limited to an annual average sulfur content of 0.05% by weight. Fuel sulfur content for the turbines is, therefore, below the NSPS requirements. The corresponding maximum flue gas SO_2 concentrations will also be well below the NSPS standards, with SO_2 emissions of about 1 ppmvd corrected to 15 percent O_2 during gas firing and 10 ppmvd corrected to 15 percent O_2 during fuel oil firing.

Pleasants Energy, LLC will continue to follow existing permit requirements for fuel monitoring to satisfy the monitoring requirements for sulfur content of the natural gas as required in 40 CFR 60.334.

40 CFR 60 Subpart KKKK: Standards of Performance for Stationary Combustion Turbines *(Not Applicable)*

Subpart KKKK is only applicable to stationary combustion turbines that commenced construction, modification or reconstruction after February 18, 2005. The Pleasants Energy, LLC turbines commenced construction in 2001. Additionally, simply increasing the hours of operation alone, does not meet the definition of "modified" per 40 CFR 60.14(e)(3).

40 CFR 60 Subpart TTTT: Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units *(Not Applicable)*

Subpart TTTT is only applicable to stationary combustion turbines that commenced construction after January 8, 2014 or reconstruction after June 18, 2015. The Pleasants Energy, LLC turbines commenced construction in 2001. Additionally, simply increasing the hours of operation alone, does not meet the definition of "reconstruction" per the NSPS.

PSD REVIEW REQUIREMENTS

In 1977 Congress passed the Clean Air Act Amendments (CAAA), which included the Prevention of Significant Deterioration (PSD) program. This program was designed to allow industrial development in areas that were in attainment with the NAAQS without resulting in a non-attainment designation for the area. The program, as implied in the name, permits the deterioration of the ambient air in an area (usually a county) as long as it is within defined limits (defined as increments). The program, however, does not allow for a significant (as defined by the rule) deterioration of the ambient air. The program prevents significant deterioration by allowing concentration levels to increase in an area within defined limits - called pollutant increments - as long as they never increase enough to exceed the NAAQS. Projected concentration levels are calculated using complex computer simulations that use meteorological data to predict impacts from the source's potential emission rates. The concentration levels are then, in turn, compared to the NAAQS and increments to verify that the ambient air around the source does significantly deteriorate (violate the increments) or violate the NAAQS. The PSD program also requires application of best available control technology (BACT) to new or modified sources, protection of Class 1 areas, and analysis of impacts on soils, vegetation, and visibility.

WV implements the PSD program as a SIP-approved state through 45CSR14. As a SIP-approved state, WV is the sole issuing authority for PSD permits. EPA has reviewed 45CSR14 and concluded that it incorporates all the necessary requirements to successfully meet the goals of the PSD program as discussed above. EPA retains, however, an oversight role in WV's administration of the PSD program.

As stated above, the modification of the Pleasants Energy, LLC Plant is defined as a construction of a "major stationary source" under 45CSR14 and PSD review is required for the pollutants of CO, NO_x, $PM_{2.5}$, PM_{10}, TSP, and Greenhouse Gasses. The substantive requirements of a PSD review includes a best available control technology (BACT) analysis, a modeling analysis, and an additional impacts analysis - each of which will be discussed below.

BACT Analysis - Section 8.2

Pursuant to 45CSR14, Section 8.2, Pleasants Energy, LLC is required to apply BACT to each emission source that is constructed and emits a PSD pollutant. BACT is defined under §45-14-2.12 as:

". . .an emissions limitation (including a visible emissions standard) based on the maximum degree of reduction for each regulated NSR pollutant which would be emitted from any proposed major stationary source or major modification which the Secretary, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any federally enforceable emissions limitations or emissions limitations enforceable by the Secretary. If the Secretary determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results."

A determination of an appropriate BACT emission limit is conducted by using a "top-down" analysis. The key steps in performing a "top-down" BACT analysis are the following: 1) Identification of all applicable control technologies; 2) Elimination of technically infeasible options; 3) Ranking remaining control technologies by control effectiveness; 4) Evaluation of most effective controls and documentation of results; and 5) the selection of BACT. Also included in the BACT selection process is the review of BACT determinations at similar facilities using the RACT/BACT/LAER Clearinghouse (RBLC). The RBLC is a database of RACT, BACT, and LAER determinations maintained by EPA and updated by the individual permitting authorities. It can be accessed online at http://cfpub.epa.gov/rblc/. Pleasants Energy, LLC included a BACT analysis in their permit application generally using the top-down approach as described above. Their complete analysis, including appropriate economic calculations, is included in the Pleasants Energy, LLC permit application and amendments and revisions thereto.

The following table summarizes the Pleasants Energy, LLC BACT selections.

Table 15: BACT Selection

Source	PSD Pollutant(1)							
	CO		NO_x		$PM_{2.5}/PM_{10}/PM$(2)		GHGs	
	Limit	Tech.(3)	Limit	Tech.(3)	Limit	Tech.(3)	Limit (CO_{2e})	Tech.(3)
Turbines(4)	9 ppm 20 ppm	CP	9.0 ppm 42 ppm	DLNB, Water Inject	15.0 lb.hr w/o TP 17.2 lb/hr w/ TP 39 lb/hr	AF, NG, ULSD	1,297 lb/ MW-hr 1,570 lb/ MW-hr	NG, GE7FA

(1) Emission rates at loads of 60% or higher.
(2) PM emission rates are given in total particulate (filterable + condensable) matter
(3) CP=Good Combustion Practices; DLNB = Dry Low NOx Burners; AF = inlet air filtration; NG = Use of Natural Gas as a fuel; ULSD = use of Ultra Low Sulfur Diesel as a fuel; GE7FA = use of GE Frame 7FA.03 turbines.
(4) Where 2 limits exist, the upper limit is when firing natural gas and the bottom limit is when firing fuel oil.

Combustion Turbines

NO_x

(1) Technology Identification: Pleasants Energy, LLC identified the following as potential NO_x control technologies applicable to the Combustion Turbines;

* Xonon™
* Water or Steam Injection
* Dry Low NO_x Burners
* SCR
* SNCR
* SCONO$_x$™ (aka EM$_x$™)

(2) Technically Infeasible Determinations: The only technologies that were determined to be technically infeasible under (1) above was the use of Xonon, SCONO$_x$ and SNCR. Xonon systems have not had wide-scale applications. It has been demonstrated on a 1.5 MW baseload unit in California, however, testing data to apply this technology to other types and sizes of turbines in currently unavailable. As the Pleasants turbines are expected to experience repeated start ups and shut downs, it is unclear how the changing load conditions would affect the Xonon system.

SCONO$_x$ systems operate most effectively at temperatures ranging from 300° to 700° F. Additionally, it uses steam to periodically regenerate the catalyst bed. Since the Pleasants facility is a simple cycle system its exhaust is significantly hotter (around 1,000°F) and has no steam readily available. Therefore, the technology was considered infeasible.

SNCRs operate most effectively at temperatures ranging from 1,600°F to 2,100°F. At operations below these temperatures the reagent will not react with the NO_x and ammonia slip will be very high. The flue gases from the combustion turbines have an exhaust temperature of around 1,000°F. Therefore, the technology was considered infeasible.

(3) Effectiveness Ranking of Remaining Technologies: Pleasants Energy, LLC ranked SCR as the top control technology with a resulting NOx emission rate of between 2.0 and 5.0 ppmvd @ 15% O_2 for natural gas and 9 to 24 ppm for fuel oil. After SCR, Dry Low NO_x burners (natural gas) and water injection (fuel oil) were selected which result in NO_x emissions of 9 ppm and 42 ppm respectively.

(4) Economically Infeasible Determinations: Pleasants Energy, LLC performed an economic analysis of the cost to install SCRs at its Waverly facility. Per 40 CFR 52.21(r)(4) the analysis looked only at the cost of installing the equipment at a new facility and ignored retrofit costs. WVDAQ reviewed the analysis and determined that it seems to comply with the OAQPS Control Cost Manual (EPA 2002). The analysis indicated that the capital cost to

install an SCR system at the facility would be approximately $19,015,000 with an annualized cost of $2,912,855 while reducing NO_x emissions by 174 tons per year. It should be noted that you cannot calculate the NO_x reduction by simply applying a 78% (the reduction from a steady state emission level of 9ppm to 2ppm) control efficiency to the entire annual NO_x emissions found in Table 6. This is because a disproportionate amount of NO_x emissions occur during start up when the SCR could not be used. Using the annualized cost shown above, and a emissions reduction of 174 tons per year, this equates to an incremental cost of $16,740.55 per ton of NO_x removed. In the writers opinion, this is not economically feasible.

(5) DAQ Review of RBLC: The following table was constructed using data for the 5 most recent entries for large gas fired simple cycle combustion turbines from the RBLC (note only entries with NO_x emissions stated as ppm were considered):

Natural Gas

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	9 ppm
TX-0788	03/24/2016	APEX Texas Power	9 ppm
TX-0777	12/09/2015	Navasota South	9 ppm
TX-0769	10/27/2015	Navasota North	9 ppm
TX-0764	10/14/2015	Nacogdoches Power	9 ppm
Avg. Emission Rate			9 ppm

Fuel Oil

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	42 ppm
WI-0240	01/26/2006	Wisconsin Elec. Power	65 ppm
NV-0036	05/05/2005	Newmont Nevada Energy	6 ppm
MD-0031	04/01/2005	Mirant Mid Atlantic	42 ppm
MS-0072	12/10/2004	TVA-Kemper	42 ppm
Avg. Emission Rate			39.4 ppm

With respect to NO_x emissions, Pleasants Energy, LLC's proposed emission rate of 9 ppmvd for natural gas firing is exactly the same as other recent RBLC entries. None of the other units employed any NO_x control technology other than DLNB. Pleasants proposed emission rate of 49 ppm when firing fuel oil is similar to the average of four of the last five entries into the RBLC. It should be noted that the one entry (NV-0036) that is significantly lower than the Pleasants proposed rate is for a facility that used simple cycle turbines as a backup at a coal fired plant. Because the turbines are located at a coal fired plant, an SCR system is already available making it more cost effective than it would be for Pleasants Energy, LLC. Other than NV-0036, no other facility requires any control except for water injection. If NV-0036 is excluded the average of the other four facilities is 47.75 ppm.

CO

(1) Technology Identification: Pleasants Energy, LLC identified Oxidation Catalysts and $SCONO_x$ as the only potential post combustion control technologies.

(2) Technically Infeasible Determinations:Pleasants Energy, LLC determined that $SCONO_x$ was not considered feasible for reasons discussed under "NO_x".

(3) Effectiveness Ranking of Remaining Technologies: Oxidation Catalyst is the only remaining control technology.

(4) Economically Infeasible Determinations: Pleasants Energy, LLC performed an economic analysis of the cost to install an Oxidation Catalyst at its Waverly facility. Per 40 CFR 52.21(r)(4) the analysis looked only at the cost of installing the equipment at a new facility and ignored retrofit costs. WVDAQ reviewed the analysis and determined that it seems to comply with the OAQPS Control Cost Manual (EPA 2002). The analysis indicated that the capital cost to install an Oxidation Catalyst system at the facility would be approximately \$8,568,365 with an annualized cost of \$1,219,367 while reducing CO emissions by 68.5 tons per year. It should be noted that you cannot calculate the CO reduction by simply applying a 78% (the reduction from a steady state emission level of 9ppm to 2ppm) control efficiency to the entire annual CO emissions found in Table 6. This is because a disproportionate amount of CO emissions occur during start up when the Oxidation Catalyst could not be used. Using the annualized cost shown above, and a emissions reduction of 68.5 tons per year, this equates to an incremental cost of \$17,800.98 per ton of CO removed. In the writers opinion, this is not economically feasible.

(5) DAQ Review of RBLC: The following table was constructed using data for the 5 most recent entries for large gas fired simple cycle combustion turbines

from the RBLC (note only entries with CO emissions stated as ppm were considered):

Natural Gas

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	9 ppm
TX-0788	03/24/2016	APEX Texas Power	9 ppm
TX-0777	12/09/2015	Navasota South	9 ppm
TX-0769	10/27/2015	Navasota North	9 ppm
TX-0764	10/14/2015	Nacogdoches Power	9 ppm
Avg. Emission Rate			9 ppm

Fuel Oil

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	20 ppm
NV-0036	05/05/2005	Newmont Nevada Energy	6 ppm
MD-0031	04/01/2005	Mirant Mid Atlantic	20 ppm
MS-0072	12/10/2004	TVA-Kemper	20 ppm
FI-0261	10/26/2004	City of Tallahasse	6 ppm
Avg. Emission Rate			14.4 ppm

With respect to CO emissions, Pleasants Energy, LLC's proposed emission rate of 9 ppmvd for natural gas firing is exactly the same as other recent RBLC entries. None of the other units employed any CO control technology other than good combustion practices. Pleasants proposed emission rate of 20 ppm when firing fuel oil is similar to the average of the last five entries into the RBLC. It is exactly the same as three of the last five, while being higher than the other two. It should be noted that the two entries (NV-0036 & FL-0261) that are significantly lower than the Pleasants proposed rate are for turbines that co-located with non turbine generating sources. In the case of NV-0036 the turbines are used as a backup at a coal fired plant. In the case of FI-0261 the turbines are used along side much larger natural gas fired boilers. Because the turbines are located at facilities with other types of sources, an Oxidation Catalyst system is likely more cost effective than it would be for Pleasants Energy, LLC. Other than NV-0036 and FI-0261, no other facility requires any control except for good combustion practices.

$PM/PM_{10}/PM_{2.5}$

(1) Technology Identification: Pleasants Energy, LLC identified the following as potential particulate control technologies applicable to the Combustion Turbines;

* Fabric Filters/Baghouses
* Electrostatic Precipitators (ESPs)
* Good Combustion Practices/high efficiency filtration of the turbine inlet and SCR dilution air.
* Replacement of existing turbines with newer, more efficient turbines.

(2) Technically Infeasible Determinations: Each of the post-combustion control technologies (i.e. baghouses and ESPs) are generally available. However, none of the technologies are considered practical or technically feasible for installation on gaseous fuel or oil fired combustion turbines.

Baghouses, ESPs, and scrubbers have never been applied to commercial combustion turbines burning gaseous fuels or oil fuels. Baghouses, ESPs, and scrubbers are typically used on solid fuel fired sources with high PM emission concentrations, and are not used in gaseous fuel-fired applications, which have inherently low PM emission concentrations. None of these control technologies is appropriate for use on gaseous or fuel oil fired combustion turbines because of their very low PM emissions levels, and the small aerodynamic diameter of PM from gaseous fuel combustion. Review of the RBLC, indicates that post-combustion controls have not been required as BACT for gaseous or fuel oil fired combustion turbines. Therefore, the use of baghouses, ESPs, and scrubbers is not considered technically feasible.

(3) Effectiveness Ranking of Remaining Technologies: The only remaining technologies are 1)replacement of existing turbines with newer (GE FA.05) ones and 2) filtration of the turbine inlet air.

(4) Economically Infeasible Determinations: Pleasants Energy, LLC performed an economic analysis of the cost to install two new GE 7FA.05 turbines at its Waverly facility. Per 40 CFR 52.21(r)(4) the analysis looked only at the cost of installing the equipment at a new facility and ignored demolition costs. WVDAQ reviewed the analysis and determined that it seems to comply with the OAQPS Control Cost Manual (EPA 2002). The analysis indicated that the capital cost to install the new turbines at the facility would be approximately $73,609,000 with an annualized cost of $5,932,000 while reducing PM emissions by 49.58 tons per year. It should be noted that Pleasants calculated a reduction of only 19 tons per year, but apparently assumed that fuel oil emissions from the new turbines would remain at 39

pounds per hour. This is obviously erroneous so the writer performed his own calculations to obtain the annual emissions reductions using the following method:

The writer used the scenario from Appendix C of the application that results in the highest PM (100% natural gas usage) and thus would be expected to see the greatest reduction. It may seem counterintuitive that the highest PM emissions occur under the scenario in which no fuel oil is used. However, this occurs because the permit will contain a condition which reduces the amount of natural gas which can be used for each gallon of fuel oil used. This has the effect of severely reducing the annual hours of operation whenever fuel oil is used. As can be seen in Appendix C, the turbines can operate a maximum of 6,195 hours each if only natural gas is used but can only operate 375 hours each if the maximum amount of fuel oil is used.

Using the above scenario, new turbines would emit:

> (3250 hrs/yr * 9.2 lbs/hr) + ((6195 hrs/yr-3250 hrs/yr)*7.0 lbs/hr) = 25.26 tons per year per turbine or 50.52 tons per year total.
>
> As can be seen from Table 6 above, PM emissions from the existing turbines will be 100.10 tons per year.
>
> 100.1 tpy - 50.52 tpy = 49.58 tpy

Using the annualized cost shown above, and a emissions reduction of 49.58 tons per year, this equates to an incremental cost of $119,645.01 per ton of PM removed. In the writers opinion, this is not economically feasible.

(5) DAQ Review of RBLC: The following table was constructed using data for the 5 most recent entries for large gas fired simple cycle combustion turbines from the RBLC. Note that only entries with either particulate emissions stated as lb/hr or with enough information to easily convert limits to lb/hr were considered:

Natural Gas

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	14.0 lb/hr
TX-0788	03/24/2016	APEX Texas Power	13.4 lb/hr
TX-0777	12/09/2015	Navasota South	8.6 lb/hr
TX-0769	10/27/2015	Navasota North	8.6 lb/hr
TX-0764	10/14/2015	Nacogdoches Power	12.09 lb/hr
Avg. Emission Rate			11.34 lb/hr

Fuel Oil

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	9.8 lb/hr
MI-0400	06/29/2011	Wolverine Power Supply	16.2 lb/hr
OH-0333	12/03/2009	Dayton Power & Light	29 lb/hr[1]
TX-0506	04/19/2006	NRG Texas	15 lb/hr
OH-0253	03/07/2006	Dayton Power & Light	15 lb/hr[1]
Avg. Emission Rate			17 lb/hr

[1]Filterable only.

With regards to PM, Pleasants Energy, LLCs proposed BACT emission rate of 17.2 pounds per hour when firing natural gas and 39 pounds per hour when firing fuel oil is significantly higher than the average of the past five entries in the RBLC for each fuel type. This can be explained by noting that two of the entries for filterable PM only while the Pleasants limit applies to total particulate (filterable and condensible). Additionally, the turbines are newer and likely a more efficient generation of turbines. As shown above, it is economically infeasible for Pleasants to replace the existing units with new turbines.

GHGs

1) Technology Identification: Pleasants Energy, LLC identified two broad strategies for reducing GHG emissions from combustion turbines: 1) minimize the production of GHGs through the use of low carbon fuels and energy efficient design; and 2) carbon capture and sequestration (CCS).

2) Technically Infeasible Determinations:

In the application, Pleasants states the following:

"...existing CO_2 capture technologies have not been applied at large power plants, as the energetic costs are prohibitive, and while more efficient approaches are being investigated, none have currently been developed past the pilot-stage. Even though post-combustion technology for CO_2 capture has not been demonstrated on a simple-cycle combustion turbine, the EPA has stated that it is considered technologically feasible, however this Project will not have a pure CO_2 stream as it is a peaking plant and will ramp up and down and start-up and shut-down daily when it operates. However, a published cost estimate for a 235 MW slipstream pilot project in West Virginia is $668 million, so scaling that linearly to a

size capable of handling the approximate 300 net MW capacity of this Project would be over $852 million. Potential carbon sequestration sites in West Virginia may exist, but the technologies to use them are mostly still in the pilot-scale phase of development, and Pleasants Energy would need to do much more investigation in order to discover where the sites are, if any, and characterize them enough to demonstrate the long-term viability of the locations. When looking at cost to construct a pipeline that may not need to be more than 50 miles, as determined from another power project (IPL Ottumwa Generating Station –in Iowa) using an average cost of approximately $1.4 million/mile of pipeline this cost is over $70 million. The capital costs would also need to include costs for gas compression, additional injection and monitoring wells necessary to handle the volume of CO_2 produced, pipeline right-of-way, operation and maintenance costs, etc.

The facts are that the qualitative cost estimate of capture and sequestration is quite high, the technological effectiveness for the capture equipment for a unit of this size has not been demonstrated in practice yet, and there is uncertainty as to whether locations capable of storing the large amounts of CO_2 that would be produced per year exist within a closer radius of the plant, and the fact that the Pleasants Energy facility does not have a pure CO_2 stream are sufficient to eliminate this option without requiring a more detailed site-specific technological or economic analysis."

(3) Effectiveness Ranking of Remaining Technologies: Pleasants Energy, LLC ranked using thermally efficient turbines in conjuction with lower carbon fuels as the top control technology. They proposed a resulting GHG emission rate of 1,900 lb CO_{2e}/MW-hr when firing fuel oil and 1,300 lb CO_{2e}/MW-hr when firing natural gas.

(4) Economically Infeasible Determinations: Since Pleasants Energy, LLC selected the top technically feasible control technologies, no economic determinations are necessary.

(5) DAQ Review of RBLC: The following table was constructed using data for the 5 most recent entries for large gas fired simple cycle combustion turbines from the RBLC (note that only entries with GHG emission limits in lb/MW-hr were used):

Natural Gas

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	1,434 lb/MW-hr
TX-0788	03/24/2016	APEX Texas Power	1,341 lb/MW-hr
TX-0778	12/16/2015	Navasota South	1,461 lb/MW-hr
TX-0775	11/13/2015	Navasota South	1,461 lb/MW-hr
FL-0355	09/10/2015	Florida Power & Light	1,374 lb/MW-hr
Avg. Emission Rate			1,414 lb/MW-hr

Fuel Oil[1]

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	1,434 lb/MW-hr
FL-0355	09/10/2015	Florida Power & Light	1,874 lb/MW-hr
Avg. Emission Rate			1,654 lb/MW-hr

[1]The writer could only find two GHG limits in the RBLC for large, simple cycle combustion turbines firing fuel oil.

Comparisons among the various combustion turbines are somewhat complicated in that different bases can be used to establish certain parameters. For example, combustion turbine outputs can be specified on a net or gross basis, and can vary based on fuel, load, ambient temperature, and other factors. GHG emission rates can be specified on a LHV or HHV basis. Nevertheless, in context, the Pleasants Energy, LLC combustion turbines compare very favorably with other recent combustion turbine projects when firing natural gas. Although the proposed rate is slightly higher than the two most recent entries for fuel oil firing, it is very close to one of the entries. Given the lack of available data in the RBLC for GHG emissions when firing fuel oil, 1,900 lb/MW-hr seems reasonable.

DAQ Conclusion on BACT Analysis

The DAQ has concluded that, with the exceptions noted above and corrected for, Pleasants Energy, LLC correctly conducted a BACT analysis using the top-down analysis and eliminated technologies for appropriate reasons. The DAQ concludes that the emission rates under Table 14 are achievable, are consistent with recent applicable BACT determinations on the RBLC, and are accepted as BACT. Further, the DAQ accepts the selected technologies and proposed efficiency rates as BACT.

Modeling Analysis - 45CSR14 Section 9 and Section 10

45CSR14 Section 9 requires subject sources to demonstrate that "allowable emission increases from the proposed source or modification, in conjunction with all other applicable emission increases or reductions would not cause or contribute to " a NAAQS violation or an exceedance of a maximum allowable increase over the baseline concentration in any area. This typically includes modeling of effects in both "Class I" and "Class II" areas.

Pleasants Energy, LLC was required to do a modeling analysis to determine the potential impacts on Class I and Class II areas. The pollutants required to be modeled were the pollutants undergoing PSD review: CO, NO_x, $PM_{2.5}$ and PM_{10}. Greenhouse gases are not modeled as part of the PSD application review process. The results of the modeling analyses are summarized below. More detailed descriptions of these modeling analyses and quantitative results are contained in reports attached to this evaluation as Attachment A. The reports were prepared by Jon McClung of DAQs Planning Section.

Class I Modeling

As part of the Clean Air Act Amendments (CAA) of 1977, Congress designated a list of national parks, memorial parks, wilderness areas, and recreational areas as federal Class I air quality areas. Federal Class I areas are defined as national parks over 6,000 acres, and wilderness areas and memorial parks over 5,000 acres. As part of this designation, the CAA gives the Federal Land Managers (FLM's) an affirmative responsibility to protect the natural and cultural resources of Class I areas from the adverse impacts of air pollution. The impacts on a Class I area from an emissions source are determined through complex computer models that take into account the source's emissions, stack parameters, meteorological conditions, and terrain.

If an FLM demonstrates that emissions from a proposed source will cause or contribute to adverse impacts on the air quality related values (AQRV's) of a Class I area, and the permitting authority concurs, the permit will be denied. The AQRVs typically reviewed, in the case of evaluating adverse impacts, are visibility (both regional and direct plume impact) and acid deposition (including both nitrogen and sulfur).

Additionally, the Class I Increments designated under National Ambient Air Quality Standards (NAAQS) may not be exceeded. Class I Increments are limits to how much the air quality may deteriorate from a reference point (called the baseline). There are Class I Increments for NO_2, PM_{10}, and SO_2.

There are generally four Class I areas that may have to be considered when conducting PSD reviews in West Virginia. These are, in West Virginia, the Otter Creek Wilderness Area and the Dolly Sods Wilderness Area; both of which are managed by the US Forest Service. The Shenandoah National Park, managed by the National Park Service, and the James River Face Wilderness Area, managed by the US Forest Service, are in Virginia. The Pleasants Energy, LLC facility is approximately 81 miles from the Otter Creek Wilderness Area, 99 miles from the Dolly Sods Wilderness Area, 124 miles from the Shenandoah National park, and 157 miles from the James River Face Wilderness Area.

On September 29, 2015, WVDAQ provided details of Pleasants Energy, LLCs proposed project to both the US Forest Service and the National Park Service. On October 6, 2015, both agencies requested copies of the permit application which WVDAQ provided on October 7, 2015. During followup conversations both the USFS and NPS requested that Pleasants perform a Class I modeling analysis for all four previously mentioned Class I areas. On March 2, 2016, Pleasants submitted to WVDAQ, USFS and NPS the final report detailing the results from said analysis.

Pleasants used CALPUFF to model both visibility and deposition effects on the Class I areas. Additionally, Pleasants performed a Class I increment analysis. The results indicated that the project should not have any noticeable effect on visibility nor have any adverse impacts resulting from deposition. As shown below in Tables 15 and 16, when evaluating the impacts as they relate to the Class I Significant Impact Levels (SILs), the modeling showed that even at a distance of 50 km (31 miles) most impacts were below the SILs and all impacts were below the SILs at the actual Class I areas.

Table 16

Pollutant	Averaging Period	Maximum Modeled value at 50 kilometer receptor (μg/m³)				Class I Significant Impact Level (μg/m³)
		Otter Creek Wilderness	Dolly Sods Wilderness	Shenandoah National Park	James River Face Wilderness	
PM_{10}	24-hour	0.0972	0.0499	0.0526	0.0733	0.3
	Annual	0.0036	0.0018	0.0018	0.0020	0.2
$PM_{2.5}$	24-hour	**0.0972**[1]	0.0499	0.0526	**0.0733**[1]	0.07
	Annual	0.0036	0.0018	0.0018	0.0020	0.06
NO_2	Annual	0.0139	0.0071	0.0071	0.0078	0.1

[1]Value exceeded the SIL.

Table 17

Maximum Modeled value ($\mu g/m^3$)		Class I Significant Impact Level ($\mu g/m^3$)
Otter Creek Wilderness	James River Face Wilderness	
0.0401	0.0146	0.07

Class II Modeling

A Class II Modeling analysis can require up to three runs to determine compliance with Rule 14. First, the proposed source is modeled by itself, on a pollutant by pollutant basis, to determine if it produces a "significant impact;" an ambient concentration published by US EPA. If the dispersion model determines that the proposed source produces significant impacts, then the demonstration proceeds to the second stage. If the model finds that the proposed source produces "insignificant impacts", no further modeling is needed. The modeling indicated that only the 1 hour standard for NO_2 and 24 hour standard for $PM_{2.5}$ were "significant" (see Table 17) thereby requiring the applicant to proceed to the next stage of the modeling process for those pollutants.

Table 18

Pollutant	**Averaging Period**	**Year**	**Maximum Modeled Concentration ($\mu g/m^3$)**	**Significant Impact Level (SIL) ($\mu g/m^3$)**
NO_2	Annual	2012	0.1	1
	1-hour	5 years	**45.7**[1]	7.5
CO	1-hour	2012	174.3	2000
	8-hour	2013	80.0	500
PM_{10}	Annual	2012	0.03	1
	24-hour	2014	2.8	5
$PM_{2.5}$	Annual	5 years	0.02	0.3
	24-hour	5 years	**2.1**[1]	1.2

[1]Value exceeded the SIL

The next tier for those standards which exceed the SIL (in this case the 1 hour NO_2 standard and 24 hour $PM_{2.5}$ standard) of the modeling analysis is to determine if the proposed facility in combination with the existing sources will produce an ambient impact that is less than the National Ambient Air Quality Standards (NAAQS).

As shown in Tables 18, although the maximum modeled concentration in the form of the standard for each scenario exceeds the NAAQS, Pleasants Energy, LLC's contribution is less than the Significant Impact Limit (SIL) paired in time and space. Per Jon McClung "It has been EPA and WVDAQs longstanding policy that a facility does not 'cause or contribute to' an exceedance of the NAAQS if its contribution is less than the SIL."

Table 19

Pollutant and Averaging Period		Maximum Modeled Con-centration	Background Con-centration	Total Con-centration	NAAQS	Pleasants Energy Contribution	SIL
		(µg/m³)					
NO_2	1-hr	141.4	68.3	209.7	188	0.019	7.5
$PM_{2.5}$	24-hr	582.8	19.4	602.2	35	0.073	1.2

The last stage is usually to determine how much of the PSD Increment the proposed construction of the facility consumes, along with all other increment consuming sources. This value may not exceed the PSD Increment. PSD Increments are the maximum concentration increases above a baseline concentration that are allowed. However, an increment for the 1 hour NO_2 standard has not been established. Therefore, only the 24 hour $PM_{2.5}$ standard was evaluated. As can be seen in Table 19, Pleasants Energy's contribution to the maximum increment exceedance, and all increment exceedances at all modeled receptors, was below the SIL.

Table 20

Pollutant and Averaging Period		Maximum Modeled Concentration	PSD Class II Increment	Pleasants Energy Contribution	SIL
		(µg/m³)			
$PM_{2.5}$	24-hr	882.8	9	0.093	1.2

The applicant therefore passes all the required Air Quality Impact Analysis tests as required under 45CSR14. Attached to this evaluation is a report prepared by Jon McClung on September 19, 2016 that details the above analysis.

Additional Impacts Analysis - 45CSR14 Section 12

Section 12 of 45CSR14 requires an applicant to provide "an analysis of the impairment to visibility, soils, and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial, and other growth associated with the source or modification." It also requires the applicant to perform "an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial and other growth associated with the source or modification." No quantified thresholds are promulgated for comparison to the additional impacts analysis

Pleasants Energy, LLC provided an extensive Additional Impacts Analysis in the application. In their analysis, they looked at potential impacts of economic growth associated with the proposed facility, as well as potential impacts on soils, vegetation and local visibility. Additionally, as discussed above, the applicant also performed deposition and visibility modeling for Class I areas. The conclusions of their analysis are included below. Pleasants full analysis is available in the application and supplemental material submitted on March 2, 2016 and included in the file.

"As shown by the results presented in this section of the application and additional supplemental information, the Project will not have a significant adverse impact on the air quality, soils, vegetation, visibility and or growth in the surrounding area."

Minor Source Baseline Date (Pleasants County, WV) - Section 2.42.b

On April 18, 2016 the permit application R14-0034 was deemed complete. This action, as per 45CSR14, Section 2.42.b, has triggered the minor source baseline date (MSBD) for the following areas:

Table 21: Minor Source Baseline Triggering

Pollutant	Pleasants County	Wood County
NO_2	Previously	Previously
PM_{10}	Previously	No
$PM_{2.5}$	Yes	Yes[1]

[1]Triggered because modeled impacts in Wood County exceed the SIL.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides general toxicity information for those pollutants not classified as "criteria pollutants." Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO_x), Ozone, Particulate Matter (PM), and Sulfur Dioxide (SO_2). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal and state programs designed to limit their emissions and public exposure. These programs include federal source-specific HAP limits promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of Hazardous Air Pollutants (HAPs). All non-criteria regulated pollutants proposed to be emitted by the facility with the exception of sulfuric acid mist (H_2SO_4) are defined as Hazardous Air Pollutants (HAPs). HAPS and H_2SO_4 will be discussed separately below.

HAPs

Section 112(b) of the Clean Air Act (CAA) identifies 188 compounds as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. The combustion of both natural gas and fuel oil have the potential to produce HAPs. However, the potential HAP emissions from the facility are below the levels that define a major HAP source. Therefore, the facility is considered a minor (or area) HAP source, and no source-specific major source NESHAP or MACT standards apply. The following table lists each HAP potentially emitted by the facility in excess of 20 pounds/year (0.01 tons/year) and the carcinogenic risk associated thereto (as based on analysis provided in the Integrated Risk Information System (IRIS)):

Table 22: Potential HAP Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
Acetaldehyde	VOC	Yes	B2 - Probable Human Carcinogen
Acrolein	VOC	No	Not Assessed
Benzene	VOC	Yes	A - Human Carcinogen
Ethylbenzene	VOC	No	D-Not Classifiable
Formaldehyde	VOC	Yes	B1 - Probable Human Carcinogen
Hexane	VOC	No	Inadequate Data
Naphthalene	VOC	Yes	C-Possible Human Carcinogen
PAHs[1]	VOC	Yes	B2 - Probable Human Carcinogen
Toluene	VOC	No	Inadequate Data
Xylene	VOC	No	Inadequate Data
2,2,4-Trimethylpentane	VOC	No	Not Classified
Biphenyl	VOC	No	D-Not Classifiable
1,3-Butadiene	VOC	Yes	Carcinogenic by Inhalation
Methanol	VOC	No	Not Classified
Manganese	PM	No	D-Not Classifiable

[1]Polycyclic Aromatic Hydrocarbons (PAHs) defines a broad class of compounds some of which include compounds classified as B2-probable human carcinogens.

All HAPs also have other non-carcinogenic chronic and acute effects. These adverse health affects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, there are no federal or state ambient air quality standards for these specific chemicals. The regulatory applicability of any potential NESHAP or MACT to the Pleasants Energy, LLC Plant was discussed above. For a complete discussion of the known health effects refer to the IRIS database located at www.epa.gov/iris.

Sulfuric Acid Mist (H_2SO_4)

The compound of H_2SO_4 is regulated under 45CSR14 with a significance level that can trigger BACT for each source that contributes H_2SO_4 emissions. As discussed above, the potential H_2SO_4 emissions from the facility did not trigger a BACT analysis for the compound. H_2SO_4 is not represented in the IRIS database and is not listed as a HAP. Concerning the carcinogenity of sulfuric acid, the Agency for Toxic Substances and Disease Registry (ATSDR) states that "[t]he ability of sulfuric acid to cause cancer in laboratory animals has not been studied. The International Agency for Research on Cancer (IARC) has determined that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans. IARC has not classified pure sulfuric acid for its carcinogenic effects."

MONITORING, REPORTING, AND RECORD-KEEPING OF OPERATIONS

Emissions Monitoring

The primary purpose of emissions monitoring is to guarantee the permittee's compliance with emission limits and operating restrictions in the permit on a continuous basis. Emissions monitoring may include any or all of the following:

* Real-time continuous emissions monitoring to sample and record pollutant emissions (CEMS, COMS);
* Parametric monitoring of variables used to determine potential emissions (recording of material throughput, fuel usage, production, etc.);
* Monitoring of control device performance indicators (pressure drops, catalyst injection rates, etc.) to guarantee efficacy of pollution control equipment;
* Visual stack observations to monitor opacity.

*	It is the permittee's responsibility to record, certify, and report the monitoring results so as to verify compliance with the emission limits. Specific emissions monitoring requirements for each emissions unit at the Pleasants Energy, LLC facility are discussed below.

Pleasants Energy, LLC shall be required to show continuous compliance with the turbine emission limits by using the monitoring specified in the following table:

Table 23

Pollutant	Monitoring Method	Permit/Rule Citation	Comment
CO	Initial stack test + fuel usage+records of start ups and shutdowns	Permit	Method 10 or 10B
NO_x	CEMS	40 CFR 75	Pursuant to §75.10
$PM/PM_{10}/PM_{2.5}$	Initial stack test, fuel usage	Permit	Method 5 & Method 202 or other as approved
SO_2	Fuel usage + fuel sulfur content	Subpart GG	Fuel S content Pursuant §60.334(h)(1)
VOCs	Initial stack test, fuel usage	Permit	Method 18 or 25 as approved or other as approved
Lead	Fuel usage	Permit	
H_2SO_4	Fuel usage + fuel sulfur content	Permit	Fuel S content Pursuant to §60.334
GHGs	Initial stack test + fuel usage	Permit	CEMS, Method 3A or 3C as approved for CO_2. Calcs for non CO_2 GHGs.
HAPs	Fuel usage	Permit	
Opacity	Monthly VE readings	Permit	Method 22

The CEMS will provide a continuous and real-time method of determining compliance with the emission limits specified in the permit. The CEMS will be installed and operated according to the applicable provisions of 40 CFR 60. Parametric monitoring will also be used to show compliance with emissions limits. This will include monitoring fuel combusted in the turbines and sampling the fuel to determine its constituent characteristics.

Record-Keeping

Pleasants Energy, LLC will be required to follow the standard record-keeping boilerplate in the permit. This will require them to maintain records of all data monitored in the permit and keep the information for five years. All collected data will be available to the Director upon request. Pleasants Energy, LLC will also be required to follow all the record-keeping requirements as applicable in the 40 CFR 60 Subpart GG. The existing natural gas fired and fuel oil fired engines shall continue to follow the record-keeping requirements of 40 CFR 60 Subparts IIII and JJJJ and 40 CFR 63 Subpart ZZZZ.

Reporting

Pleasants Energy, LLC will also be required to follow all the reporting requirements as applicable in the 40 CFR 60 Subpart GG for the turbine. The existing natural gas fired and fuel oil fired engines shall continue to follow the reporting requirements of 40 CFR 60 Subparts IIII and JJJJ and 40 CFR 63 Subpart ZZZZ.

PERFORMANCE TESTING

Performance testing is required to verify the emission factors used to determine the units' potential-to-emit and show compliance with permitted emission limits. Performance testing must be conducted in accordance with accepted test methods and according to a protocol approved by the Director prior to testing. All units subject to a standard under 40 CFR 60 are required to perform an initial performance test according to the applicable Subpart. Periodic testing may be required thereafter depending on the specifics of the emissions unit in question. Under the WV SIP, testing is required at the discretion of the Director.

Initial and periodic testing is required on each turbine stack to determine compliance with the following emission limits using the test methods approved by WVDAQ.

Performance testing after the initial test will be required on a schedule set forth in the permit. The permittee shall also be required to test and verify initial compliance with BACT limits in the permit for the turbines and thereafter on a schedule set forth in the permit.

Black Start Generator/TurboPhase Engines

Performance testing for black start generators and TurboPhase engines are limited to those required under 40 CFR 60, Subparts IIII and JJJJ.

RECOMMENDATION TO DIRECTOR

The WVDAQ has preliminarily determined that the modification of the Pleasants Energy, LLC, natural gas fired power plant near Waverly, but In Pleasants County will meet the emission limitations and conditions set forth in the DRAFT permit and will comply with all current applicable state and federal air quality rules and standards including 45CSR14, the WV Legislative Rule implementing the Prevention of Significant Deterioration program. A final decision regarding the DRAFT permit will be made after consideration of all public comments. It is the recommendation of the undersigned, upon review and approval of this document and the DRAFT permit, that the WVDAQ, pursuant to §45-14-17, go to public notice on permit application R14-0034.

Steven R. Pursley, PE
Engineer

9-26-16

September 26, 2016

Attachment A: Modeling Analyses

MEMO

To: Steve Pursley
From: Jon McClung JDM
CC: Laura Crowder, Bev McKeone, Joe Kessler, Ed Andrews
Date: September 19, 2016
Re: Pleasants Energy, LLC Modeling Review - PSD Application R14-0034

I have completed my review and replication of the air dispersion modeling analysis submitted in support of the PSD permit application (R14-0034) for the proposed modification of the Pleasants Energy, LLC (Pleasants Energy) facility located near Waverly, West Virginia, within Pleasants County. This dispersion modeling analysis is required pursuant to §45-14-9 (Requirements Relating to the Source's Impact on Air Quality).

As part of the review process, an applicant for a PSD permit performs the air quality impact analysis and submits the results to the Division of Air Quality (DAQ). The DAQ then reviews and replicates the modeling runs to confirm the modeling inputs, procedures, and results. This memo contains a synopsis of the modeling analysis. For a complete technical description of the modeling analysis, please consult the protocol and modeling analysis report submitted by the applicant.

Pleasants Energy installed two simple-cycle General Electric (GE) 7FA combustion turbines at the Pleasants Energy facility in 2001, under Permit R13-2373, with an administrative amendment in 2006 (R13-2373A). The permit had operational restrictions to limit the facility's potential to emit to less than 250 tons per year (tpy) of any criteria pollutant so the facility could be minor for PSD. In this PSD permit application (R14-0034), Pleasants Energy proposes to modify the facility by increasing the operating time of the combustion turbines. The existing Pleasants Energy facility includes two TurboPhase units that consist of four engines each and five Tier IV diesel generators.

Class I Area Analysis

The Federal Land Managers responsible for evaluating affects on Air Quality Related Values (AQRVs) for federally protected Class I areas were consulted and required modeling analyses specific to Class I areas for the proposed project. CALPUFF was used to model the visibility and deposition effects on the Class I areas of Otter Creek Wilderness and Dolly Sods Wilderness in West Virginia and Shenandoah National Park and James River Face Wilderness in Virginia. A Class I increment analysis was also completed. The CALPUFF modeling results indicate that the project is not expected to have any noticeable effect on visibility and is not expected to have adverse impacts resulting from deposition. In addition, CALPUFF was used to demonstrate that the impacts from the project will be below Class I significant impact levels (SIL) for the Class I areas. Tables 1 and 2 contain the results of the Class I significance modeling. No further modeling is required for the Class I areas. Attachment 1 contains the determinations by the

Federal Land Managers of no significant impacts to any AQRVs at Class I areas. The complete results of this analysis are contained in the Class I modeling report submitted by the applicant.

Table 1. Screening Modeled (AERMOD) Impacts and Class I Area Significant Impact Level[a]

Pollutant	Averaging Period	Maximum Modeled value at 50 kilometer receptor (μg/m³)				Class I Significant Impact Level (μg/m³)
		Otter Creek Wilderness	Dolly Sods Wilderness	Shenandoah National Park	James River Face Wilderness	
PM_{10}	24-hour	0.0972	0.0499	0.0526	0.0733	0.3
	Annual	0.0036	0.0018	0.0018	0.0020	0.2
$PM_{2.5}$	24-hour	**0.0972**	0.0499	0.0526	**0.0733**	0.07
	Annual	0.0036	0.0018	0.0018	0.0020	0.06
NO_2	Annual	0.0139	0.0071	0.0071	0.0078	0.1

[a]Bold indicates modeled value exceeds SIL

Table 2. $PM_{2.5}$ 24-hour Modeled (CALPUFF) Impacts and Class I Area Significant Impact Level

Maximum Modeled value (μg/m³)		Class I Significant Impact Level (μg/m³)
Otter Creek Wilderness	James River Face Wilderness	
0.0401	0.0146	0.07

Class II Area Analysis

Pleasants County, WV is in attainment or unclassifiable/attainment status for all criteria pollutants. Project emissions of SO_2 are below the significant emission rate (SER), therefore SO_2 is not subject to PSD review. Pollutants emitted in excess of the SER are subject to PSD review in areas of attainment. The criteria pollutants that exceed the SER associated with the proposed facility are in Table 3 (highlighted in bold).

Table 3. Project emission rates

Pollutant	Project Emissions (tons/yr)	Significant Emission Rate (tons/yr)
NO_x	**464.6**	40

Pollutant	Project Emissions (tons/yr)	Significant Emission Rate (tons/yr)
CO	**509.5**	100
SO_2	39	40
$PM/PM_{10}/PM_{2.5}$	**118.7**	25/15/10
VOC	23.8	40
GHG (CO2e)	**1,231,633**	75,000

Dispersion modeling was conducted for NO_x, CO, PM_{10}, and $PM_{2.5}$. Greenhouse gases (GHG) are not modeled as part the PSD application review process and VOC emissions as a precursor to tropospheric ozone formation were addressed through a qualitative analysis by the applicant in the modeling protocol. Modeled emission rates and stack parameters are included Tables 4 and 5.

Table 4. Combustion Turbine Emissions and Modeling Parameters - Natural Gas Operation (per Turbine)

Pollutant	100% Load with TurboPhase	100% Load	80% Load	Start-up/Shut down
	pounds per hour (lb/hr)			
NO_x	75 (53[a])	65 (53[a])	54 (53[a])	121.2 (53[a])
CO	36	32	26	384.4
PM_{10}	20.2 (11.54[a])	18 (11.54[a])	18 (11.54[a])	18 (11.54[a])
$PM_{2.5}$	20.2 (11.54[a])	18 (11.54[a])	18 (11.54[a])	18 (11.54[a])
Stack Parameters				
Stack temperature (°F)	1,131	1,131	1,097	1,097
Exit velocity (ft/s)	166.6	148.2	139.6	139.6
Stack height (feet)	114.5	114.5	114.5	114.5
Stack diameter (feet)	18	18	18	18

[a]Maximum annualized emissions.

Table 5. Combustion Turbine Emissions and Modeling Parameters - Fuel Oil Operation (per Turbine)

Pollutant	100% Load	80% Load	Start-up/Shut down
	pounds per hour (lb/hr)		
NO_x	53[a]	53[a]	53[a]
CO	72	53	230.4
PM_{10}	39 (11.54[a])	39 (11.54[a])	39 (11.54[a])
$PM_{2.5}$	39 (11.54[a])	39 (11.54[a])	39 (11.54[a])
Stack Parameters			
Stack temperature (°F)	1,131	1,158	1,158
Exit velocity (ft/s)	148.2	141.7	141.7
Stack height (feet)	114.5	114.5	114.5
Stack diameter (feet)	18	18	18

(a)Maximum annualized emissions.

Table 6 presents a summary of the air quality standards that were addressed for NO_2, CO, PM_{10}, and $PM_{2.5}$. The pollutants, averaging times, increments, significant impact levels (SILs) and National Ambient Air Quality Standards (NAAQS) are listed. The SIL for 1-hour NO_2 represents the value the Division of Air Quality has implemented as described in the memorandum included in Attachment 2.

Table 6. Ambient Air Quality Standards, SILs, and PSD Increments

Pollutant	Averaging Period	SIL	PSD Increments	NAAQS
		µg/m³		
NO_2	1-Hour	7.5	-	188

Pollutant	Averaging Period	SIL	PSD Increments	NAAQS
		μg/m³		
NO_2	Annual	1	25	100
PM_{10}	24-Hour	5	30	150
	Annual	1	17	-
$PM_{2.5}$	24-Hour	1.2	9	35
	Annual	0.3	4	12
CO	1-Hour	2000	-	40,000
	8-Hour	500	-	10,000

An air quality impact analysis, as a part of the PSD review process, is a two tiered process. First, a proposed facility is modeled by itself, on a pollutant-by-pollutant and averaging-time basis, to determine if ambient air concentrations predicted by the model exceed the significant impact level (SIL). If ambient impacts are below the SIL then the proposed source is deemed to not have a significant impact and no further modeling is required. If ambient impacts exceed the SIL then the modeling analysis proceeds to the second tier of cumulative modeling. The cumulative modeling analysis consists of modeling the proposed facility with existing off-site sources and adding representative background concentrations and comparing the results to PSD increments (increment consuming and expanding sources only) and NAAQS. In order to receive a PSD permit, the proposed source must not cause or contribute to an exceedance of the NAAQS or PSD increments. In cases where the PSD increments or NAAQS are predicted to be exceeded in the cumulative analysis, the proposed source would not be considered to cause or contibute to the exceedance if the project-only impacts are less that the SIL.

On January 22, 2013, the U.S. Court of Appeals for the District of Columbia Circuit vacated two provisions in EPA's PSD regulations containing SILs for $PM_{2.5}$. The court granted the EPA's request to remand and vacate the SIL provisions in Sections 51.166(k)(2) and 52.21(k)(2) of the regulations so that EPA could address corrections. EPA's position remains that the court decision does not preclude the use of SILs for $PM_{2.5}$ but special care should be taken in applying the SILs for $PM_{2.5}$. This special care involves ensuring that the difference between the NAAQS and the representative measured background concentration is greater than the SIL. If this difference is greater than the SIL, then it is appropriate to use the SIL as a screening tool to inform the decision as to whether to require a cumulative air quality impact analysis. As shown in Table 7, for both the 24-hr and annual averaging time for $PM_{2.5}$, this difference is greater than the SIL and it is appropriate to use the SIL as a screening tool. Included in Attachment 3 are the Final, Certified West Virginia $PM_{2.5}$ Design Values.

Table 7. $PM_{2.5}$ NAAQS, Monitor Design Values, and Significant Impact Levels

$PM_{2.5}$ Averaging Period	NAAQS	Vienna Monitor Design Value (54-107-1002)	Difference between NAAQS and Monitored Value	Significant Impact Level (SIL)
		2013-2015		
	µg/m³			
24-hr	35	21	14	1.2
Annual	12	9.4	2.6	0.3

Modeling Basis

The modeling system used conforms to 40 CFR 51 Appendix W, applicable guidance, and the approved protocol and is summarized below:

- The latest version of AERMOD available was used (version 15181) in default mode, except as noted below. The AERMOD modeling system (AERMOD, AERMET, AERMAP) is the regulatory default modeling system for near-field (<50km) regulatory dispersion modeling.
- AERMET (version 14134) was used to process five years of surface meteorological data from the Parkersburg Wood County Airport (Station ID 03804). Upper air and data from Wilmington Airborne Park, Ohio (Station ID 13841) were used.
- The latest version of AERSURFACE (13016) was used to develop appropriate surface characteristic (albedo, bowen ratio, surface roughness) inputs to AERMET.
- A nested receptor grid was developed and AERMAP was used to determine terrain heights and hill height scales for use by AERMOD.
- The U.S. EPA Tier III NO_x to NO_2 conversion non-default Ozone Limiting Method (OLM) was used to demonstrate compliance with the 1-hr NO_2 NAAQS. The Division of Air Quality obtained alternative-model status approval from EPA Region III on April 8, 2016 (Attachment 4). Background ozone data for OLM were obtained from the Vienna, WV monitor (50-107-1002) for the ozone season and non-ozone season data was obtained from the Quaker City, Ohio monitor (39-121-9991) and the Lawrenceville monitor in Pittsburgh, PA (43-003-0008).
- Background NO_2 monitoring data for the cumulative analysis for 1-hr NO_2 were obtained from a monitor in Washington County, PA (ID # 41-125-0005). Consistent with EPA guidance, background data represents the multiyear (2012, 2013, and 2014) average of the 98th percentile. Background 24-hour PM2.5 monitoring data was obtained from the Vienna, WV monitor (54-107-1002) and the 98th percentile averaged over year 2012 to 2014 was used.
- The U.S. EPA Building Profile Input Program (BPIP), Version 04274 with PRIME, was used to calculate downwash effects for the project emissions sources.

- AERMOD was used to model direct emissions of $PM_{2.5}$. Secondary formation of $PM_{2.5}$ resulting from precursor emissions of NO_x was addressed qualitatively by the applicant in the modeling protocol.

<u>Modeling Operating Scenarios</u>

Combustion Turbines

The project sources subject to PSD review are the two GE combustion turbines installed in 2001. All modeling scenarios were modeled for each hour of the five-year meteorological record, except as noted below. The combustion turbines will emit pollutants at varying rates depending on the operating load of the turbine, fuel type, and TurboPhase usage. The operating load of the turbines will affect the stack gas parameters of temperature and velocity, which will in turn affect dispersion and ambient concentrations predicted by the model. A load analysis is required by Appendix W of 40 CFR 51, as referenced in §45-14-10 (Modeling Requirements) to ensure that worst case ambient concentrations are identified in the modeling analysis. Pleasants Energy analyzed load-varying scenarios for operation while combusting natural gas and fuel oil. The natural gas operating scenarios include 100% load with TurboPhase, 100% load, 80% load, 60% load and start-up/shutdown. The fuel oil operating scenarios include 100% load, 80% load, 60% load and start-up/shutdown. The natural gas and fuel oil scenarios were modeled for $PM_{2.5}$ (24-hr and annual), NO_2 (annual), and CO (1-hr and 8-hr). The natural gas scenarios were modeled for 1-hr NO_2.

The combustion turbine back-up fuel oil operation will only be used in emergency situations when natural gas is curtailed and for testing purposes. Fuel oil operation start-up is limited to a maximum of 20 start-ups per year. The approved modeling protocol excludes the fuel oil operation scenarios from the modeling analysis for 1-hr NO_2 since, consistent with EPA modeling guidance, the intermittent nature of the fuel oil scenarios (20 startups per year, emergency operation only) is not continuous enough or frequent enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations.

Non-project Pleasants Energy sources

The existing sources at Pleasants Energy not subject to PSD review include two TurboPhase units that consist of four engines each and five Tier IV diesel generators. The existing Pleasants Energy sources were modeled in the cumulative scenarios as non-PSD-project inventory sources for 1-hr NO_2 and 24-hr $PM_{2.5}$. The two TurboPhase units were modeled simultaneously for the entire meteorological record. Two of the five Tier IV diesel generators were modeled simultaneously for the entire meteorological record. Pleasants Energy is proposing to operate only two of the five diesel generators at any time.

SIL Analysis Results (Tier I)

The results of the Significant Impact Analysis for the Pleasants Energy project sources are included in Table 8. The results represent continuous operation of both turbines simultaneously for 8760 hour/year and are the highest first-highest concentration. For all pollutants and averaging times, the maximum modeled concentration is below the significant impact level except for 1-hr NO_2 and 24-hr $PM_{2.5}$. Therefore, further modeling analysis is necessary for 1-hr NO_2 and 24-hr $PM_{2.5}$.

Table 8. SIL Analysis Results

Pollutant	Averaging Period	Year	Maximum Modeled Concentration ($\mu g/m^3$)	Significant Impact Level (SIL) ($\mu g/m^3$)
NO_2	Annual	2012	0.1	1
	1-hour	5 years	**45.7**	7.5
CO	1-hour	2012	174.3	2000
	8-hour	2013	80.0	500
PM_{10}	Annual	2012	0.03	1
	24-hour	2014	2.8	5
$PM_{2.5}$	Annual	5 years	0.02	0.3
	24-hour	5 years	**2.1**	1.2

Cumulative Analysis Results (Tier II)

The results of the Cumulative Impact Analysis for the 24-hr PM2.5 NAAQS of 35 $\mu g/m^3$ and the 1-hr NO_2 NAAQS of 188 $\mu g/m^3$ are included in Table 7. This analysis includes impacts from the Pleasants Energy Project sources, Pleasants Energy non-PSD-project existing sources, off-site existing sources, and representative background concentrations of NO_2 and $PM_{2.5}$ For the Pleasants Energy project sources, the results represent continuous operation of both turbines simultaneously for 8760 hour/year. The modeling conditions for the Pleasants Energy non-PSD-project sources are as described above. For off-site existing sources, the impacts represent maximum hourly potential emissions, as determined from Title V permits and applications obtained from the WV Division of Air Quality and for Ohio sources, from the Ohio EPA. The background concentration data is summarized above with detailed information in the applicant's modeling report.

The cumulative analysis evaluated impacts at all receptors above the SIL in the SIL analysis. The SIL analysis is based on the highest first-highest concentration. The cumulative analysis is based on the form of the 1-hr NO_2 standard, which is the 98th percentile of the yearly distribution of 1-hour daily maximum concentrations, which is equivalent to the 8th highest rank of daily maximum concentrations. The output options from AERMOD allow the determination of contribution of all sources to modeled concentrations. These options were used to determine Pleasants Energy's contribution to the total modeled concentration at all modeled receptors for all hours in the meteorological record.

Table 9 shows the maximum modeled concentrations for all the receptors modeled in the cumulative analysis for all operating scenarios. Modeled exceedances of the NAAQS are predicted and Pleasants Energy's contribution is less than the SIL, paired in time and space. EPA's and DAQ's longstanding use of the SIL as a permitting tool is that a facility does not cause or contribute to an exceedance of the NAAQS if it's contribution is less than the SIL and may still receive a permit as long as all other criteria are met. For all modeled exceedances of the NAAQS, Pleasants Energy's contribution is below the SIL for both 1-hr NO_2 and 24-hr $PM_{2.5}$.

Table 9. NO_2 and $PM_{2.5}$ NAAQS Analysis Results - Maximum Modeled Concentrations

Pollutant and Averaging Period		Maximum Modeled Con-centration	Background Con-centration	Total Con-centration	NAAQS	Pleasants Energy Contribution	SIL
		(µg/m³)					
NO_2	1-hr	141.4	68.3	209.7	188	0.019	7.5
$PM_{2.5}$	24-hr	582.8	19.4	602.2	35	0.073	1.2

Table 10 shows the maximum modeled $PM_{2.5}$ Class II Increment concentration. Pleasants Energy's contribution to the maximum increment exceedance, and all increment exceedances at all modeled receptors, remains below the SIL. An increment analysis was not performed for 1-hr NO_2 since an increment level has not been established.

Table 10. $PM_{2.5}$ Class II Increment Analysis Results

Pollutant and Averaging Period		Maximum Modeled Concentration	PSD Class II Increment	Pleasants Energy Contribution	SIL
		(µg/m³)			
$PM_{2.5}$	24-hr	882.8	9	0.093	1.2

Summary

The air quality impact analysis prepared and submitted by Pleasants Energy to the DAQ has been reviewed and replicated and conforms to 40 CFR 51 Appendix W, applicable guidance, and the modeling protocol. The analysis demonstrates that the proposed facility operations will have modeled impacts less than the SILs for all pollutants and averaging times except for 1-hr NO_2 and 24-hr $PM_{2.5}$. The cumulative modeling analysis demonstrates that Pleasants Energy's contribution to the modeled NAAQS exceedances for 1-hr NO_2 and 24-hr $PM_{2.5}$. Modeled exceedances for 24-hr Class II $PM_{2.5}$ increment are less than the SIL, therefore Pleasants Energy does not cause or contribute to the modeled exceedances.

ATTACHMENT 1

Federal Land Manager Determinations

McClung, Jon D

From: O'Dea, Claire B -FS <cbodea@fs.fed.us>
Sent: Thursday, April 14, 2016 5:15 PM
To: Hauner-Davis, Mary; jalyn_cummings@nps.gov; McClung, Jon D; andrea_stacy@nps.gov; susan_johnson@nps.gov; Kessler, Joseph R; Pursley, Steven R; John_Notar@nps.gov; Pitrolo, Melanie -FS; Anderson, Bret A -FS; Salazer, Holly
Cc: Adam.Birbeck@gdfsuezna.com; Gerald.Gatti@gdfsuezna.com; Gary.Vierling@gdfsuezna.com; Nelson, Minda
Subject: RE: Pleasants Energy Class I Visibility and Deposition Modeling Report

Hello All,

I want to thank Mary for sending along the final report on the Class I Visibility and Deposition Modeling for the Pleasants Energy Facility, as well as the CALPUFF modeling files. And I want to thank all participants in our ongoing discussions for your participation and responsiveness. Based on the visibility and deposition analysis results, and comparison with our resource concern thresholds, we anticipate no significant impacts to any air quality related values (AQRVs) at Class I Areas administered by the Forest Service.

Should the nature of this project change such that maximum emissions increase, please let us know so that we can re-evaluate the proposal.

Thank you again for keeping the Forest Service informed about permit applications for facilities that may impact Forest Service Class I Areas. Should you have any questions about this determination, please let me know.

Best,

Claire O'Dea, PhD
Air Quality Specialist
Forest Service
Eastern Regional Office
p: 202-205-1686
c: 919-368-6879
cbodea@fs.fed.us
1400 Independence Ave, SW, #1121
Washington, DC 20250
www.fs.fed.us

Caring for the land and serving people

From: Hauner-Davis, Mary [mailto:mhauner@burnsmcd.com]
Sent: Wednesday, March 02, 2016 6:13 PM
To: holly_salazer@nps.gov; jalyn_cummings@nps.gov; jon.d.mcclung@wv.gov; andrea_stacy@nps.gov; susan_johnson@nps.gov; Joseph.R.Kessler@wv.gov; Steven.R.Pursley@wv.gov; John_Notar@nps.gov; Pitrolo, Melanie -FS ; O'Dea, Claire B -FS ; Anderson, Bret A -FS
Cc: Adam.Birbeck@gdfsuezna.com; Gerald.Gatti@gdfsuezna.com; Gary.Vierling@gdfsuezna.com; Nelson, Minda
Subject: Pleasants Energy Class I Visibility and Deposition Modeling Report

All:

Attached, please find the final report on the Class I Visibility and Deposition Modeling for the Pleasants Energy facility. As requested, a hard copy of the report and a USB drive with all of the CALPUFF modeling files have been sent to Jon McClung at WV DEP, Bret Anderson at USDA Forest Service and John Notar at National Park Service. These packages should arrive via Fed-Ex to your offices tomorrow.

Please review the modeling report and files. We look forward to hearing from you soon. I will coordinate a conference call in the near future to discuss the report and modeling.

Thank you for your time and we look forward to your review of the positive results from the modeling.

Mary Hauner-Davis

Mary Hauner-Davis \ Burns & McDonnell
Manager, Air/Noise Department \ Env. Studies and Permitting
O 816-822-4252 \ M 402-730-9631 \ F 816-822-4299
mhauner@burnsmcd.com \ burnsmcd.com
9400 Ward Parkway \ Kansas City, MO 64114

McClung, Jon D

From:	Stacy, Andrea <andrea_stacy@nps.gov>
Sent:	Thursday, April 21, 2016 1:54 PM
To:	O'Dea, Claire B -FS
Cc:	Hauner-Davis, Mary; jalyn_cummings@nps.gov; McClung, Jon D; susan_johnson@nps.gov; Kessler, Joseph R; Pursley, Steven R; John_Notar@nps.gov; Pitrolo, Melanie -FS; Anderson, Bret A -FS; Salazer, Holly; Adam.Birbeck@gdfsuezna.com; Gerald.Gatti@gdfsuezna.com; Gary.Vierling@gdfsuezna.com; Nelson, Minda
Subject:	Re: Pleasants Energy Class I Visibility and Deposition Modeling Report

Hi Mary,

The NPS concurs with the USFS determination, we do not anticipate any significant additional impacts to AQRVs in Shenandoah NP as a result of this facility. We want to echo Claire's thanks for your responsiveness to our requests and concerns.

Although we will not be providing further comment with regard to the AQRV impacts or analyses, for record keeping purposes, we would appreciate it if WV DEP could submit a copy of the draft permit and associated BACT and staff analyses when these become available.

Thank you again involving the NPS in this permit determination. Please feel free to contact me if you have additional questions.

Regards,
Andrea Stacy

On Thu, Apr 14, 2016 at 3:15 PM, O'Dea, Claire B -FS <cbodea@fs.fed.us> wrote:

Hello All,

I want to thank Mary for sending along the final report on the Class I Visibility and Deposition Modeling for the Pleasants Energy Facility, as well as the CALPUFF modeling files. And I want to thank all participants in our ongoing discussions for your participation and responsiveness. Based on the visibility and deposition analysis results, and comparison with our resource concern thresholds, we anticipate no significant impacts to any air quality related values (AQRVs) at Class I Areas administered by the Forest Service.

Should the nature of this project change such that maximum emissions increase, please let us know so that we can re-evaluate the proposal.

Thank you again for keeping the Forest Service informed about permit applications for facilities that may impact Forest Service Class I Areas. Should you have any questions about this determination, please let me know.

Best,

Claire O'Dea, PhD
Air Quality Specialist
Forest Service

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Caring for the land and serving people

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Sent: Wednesday, March 02, 2016 6:13 PM
To: holly_salazer@nps.gov; jalyn_cummings@nps.gov; jon.d.mcclung@wv.gov; andrea_stacy@nps.gov; susan_johnson@nps.gov; Joseph.R.Kessler@wv.gov; Steven.R.Pursley@wv.gov; John_Notar@nps.gov; Pitrolo, Melanie -FS <mpitrolo@fs.fed.us>; O'Dea, Claire B -FS <cbodea@fs.fed.us>; Anderson, Bret A -FS <baanderson02@fs.fed.us>
Cc: Adam.Birbeck@gdfsuezna.com; Gerald.Gatti@gdfsuezna.com; Gary.Vierling@gdfsuezna.com; Nelson, Minda <mnelson@burnsmcd.com>
Subject: Pleasants Energy Class I Visibility and Deposition Modeling Report

All:

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Please review the modeling report and files. We look forward to hearing from you soon. I will coordinate a conference call in the near future to discuss the report and modeling.

Thank you for your time and we look forward to your review of the positive results from the modeling.

Mary Hauner-Davis

Mary Hauner-Davis \ Burns & McDonnell

Manager, Air/Noise Department \ Env. Studies and Permitting

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303-969-2816 (phone)
303-969-2822 (Fax)

ATTACHMENT 2

Division of Air Quality Interim Significant Impact Level Memorandum

west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
dep.wv.gov

MEMORANDUM

To: Jay Fedczak
Fred Durham

Cc: John Benedict
Bev McKeone
Joe Kessler
Steve Pursley

From: Jon McClung JDM

Date: January 28, 2014

Subject: Interim 1-Hour Significant Impact Levels for Nitrogen Dioxide and Sulfur Dioxide

Summary

As a follow-up to our discussions regarding the use of interim significant impact levels (SILs) for the 1-hour nitrogen dioxide (NO_2) and 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standards (NAAQS), I have conducted a detailed review of EPA's relevant guidance concerning their recommended SILs. EPA's guidance provides recommended SILs for 1-hr NO_2 and 1-hr SO_2 to serve as a useful screening tool for implementing the PSD requirements for an air quality analysis. EPA has provided recommended interim SILs since they have not yet codified final SILs through rulemaking. I have confirmed via discussions with the EPA Region 3 Modeler, Timothy A. Leon Guerrero, that the recommended SILs are consistent for use with EPA's PSD permitting program, as codified in 40 CFR 51. We have reviewed EPA's recommended interim SILs for 1-hr NO_2 and 1-hr SO_2 and concur with EPA's finding that an applicant for a PSD permit demonstrating an air quality impact at or below the SIL is *de minimis* in nature and would not cause a violation of the NAAQS. The interim SILs should be used in air quality impact assessments for PSD permit applications until EPA issues a final rule establishing SILs for 1-hr NO_2 and 1-hr SO_2.

Discussion

On February 9, 2010, EPA published a final rule, which became effective on April 12, 2010, establishing a new 1-hour NO_2 NAAQS at 100 ppb (188 $\mu g/m^3$ at 25 °C and 760 mm Hg), based on the 3-year average of the 98th-percentile of the annual distribution of the daily maximum 1-hour concentrations.

On June 22, 2010, EPA published a final rule, which became effective on August 23, 2010, establishing a new 1-hour SO_2 NAAQS at 75 ppb (196 μg/m^3 at 25 °C and 760 mm Hg), based on the 3-year average of the 99th-percentile of the annual distribution of the daily maximum 1-hour concentrations.

EPA guidance establishes that an air quality assessment for a PSD application begins with the applicant estimating the potential air quality impacts from the project source alone. If a source demonstrates an impact above a SIL then a cumulative impact analysis and PSD increment analysis is required. If modeled impacts do not exceed the SIL, the permitting authority may conclude that the project would not cause or contribute to a violation of the NAAQS and EPA would not consider it necessary to conduct a more comprehensive cumulative impact assessment. Establishing an appropriate SIL is an integral part of the PSD air quality analysis process since without it a permitting authority may not conclude that impacts below a SIL are *de minimis* and further analyses that may not be necessary to demonstrate compliance would automatically be required.

Interim 1-Hour NO_2 and 1-Hour SO_2 SILs

This memo documents the establishment, for the West Virginia PSD program, of an interim 1-hour NO_2 SIL of 4 ppb (7.5 μg/m^3), which is the same as that recommended by EPA in the June 29, 2010 memorandum from Stephen D. Page, *Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program.* This memorandum, which contains the technical analysis to determine the SIL, is appended as Attachment 1.

This memo also documents the establishment, for the West Virginia PSD program, an interim 1-hour SO_2 SIL of 3 ppb (7.8 μg/m^3), which is the same as that recommended by EPA in the August 23, 2010 memorandum from Stephen D. Page, *Guidance Concerning the Implementation of the 1-hour SO_2 NAAQS for the Prevention of Significant Deterioration Program.* This memorandum, which contains the technical analysis to determine the SIL, is appended as Attachment 2.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

JUN 29 2010

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program

FROM: Stephen D. Page, Director Stephen Page
Office of Air Quality Planning and Standards

TO: Regional Air Division Directors

On January 22, 2010, the Environmental Protection Agency (EPA) announced a new 1-hour nitrogen dioxide (NO_2) National Ambient Air Quality Standard (hereinafter, either the 1-hour NO_2 NAAQS or 1-hour NO_2 standard) of 100 parts per billion (ppb), which is attained when the 3-year average of the 98th-percentile of the annual distribution of daily maximum 1-hour concentrations does not exceed 100 ppb at each monitor within an area. EPA revised the primary NO_2 NAAQS to provide the requisite protection of public health. The final rule for the new 1-hour NO_2 NAAQS was published in the Federal Register on February 9, 2010 (75 FR 6474), and the standard became effective on April 12, 2010. EPA policy provides that any federal Prevention of Significant Deterioration (PSD) permit issued under 40 CFR 52.21 on or after that effective date must contain a demonstration of source compliance with the new 1-hour NO_2 standard.

EPA is aware of reports from stakeholders indicating that some sources—both existing and proposed—are modeling potential violations of the 1-hour NO_2 standard. In many cases, the affected units are emergency electric generators and pump stations, where short stacks and limited property rights exist. However, larger sources, including coal-fired and natural gas-fired power plants, refineries, and paper mills, could also model potential violations of the new NO_2 NAAQS.

To respond to these reports and facilitate the PSD permitting of new and modified major stationary sources, we are issuing the attached guidance, in the form of two memoranda, for implementing the new 1-hour NO_2 NAAQS under the PSD permit program. The guidance contained in the attached memoranda addresses two areas. The first memorandum, titled, "General Guidance for Implementing the 1-hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour NO_2 Significant Impact Level," includes guidance for the preparation and review of PSD permits with respect to the new 1-hour NO_2 standard. This guidance memorandum sets forth a recommended interim 1-hour NO_2 significant impact level (SIL) that states may consider when carrying out the required

PSD air quality analysis for NO_2, until EPA promulgates a 1-hour NO_2 SIL via rulemaking. The second memorandum, titled "Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard," includes specific modeling guidance for estimating ambient NO_2 concentrations and determining compliance with the new 1-hour NO_2 standard.

This guidance does not bind state and local governments and the public as a matter of law. Nevertheless, we believe that state and local air agencies and industry will find this guidance useful when carrying out the PSD permit process. We believe it will provide a consistent approach for estimating NO_2 air quality impacts from proposed construction or modification of NOx emissions sources. For the most part, the attached guidance reiterates existing policy and guidance, but focuses on how this information is relevant to implementation of the new 1-hour NO_2 NAAQS.

Please review the guidance included in the two attached memoranda. If you have questions regarding the general implementation guidance contained in the first memorandum, please contact Raj Rao (rao.raj@epa.gov). If you have questions regarding the modeling guidance in the second memorandum, please contact Tyler Fox (fox.tyler@epa.gov). We are continuing our efforts to address permitting issues related to NO_2 and other NAAQS including the recently-signed 1-hour sulfur dioxide NAAQS. We plan to issue additional guidance to address these new 1-hour standards in the near future.

Attachments:

1. Memorandum from Anna Marie Wood, Air Quality Policy Division, to EPA Regional Air Division Directors, "General Guidance for Implementing the 1-hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour NO_2 Significant Impact Level" (June 28, 2010).
2. Memorandum from Tyler Fox, Air Quality Modeling Group, to EPA Regional Air Division Directors, "Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard" (June 28, 2010).

cc: Anna Marie Wood
Richard Wayland
Raj Rao
Tyler Fox
Dan deRoeck
Roger Brode
Rich Ossias
Elliott Zenick
Brian Doster

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

June 28, 2010

MEMORANDUM

SUBJECT: General Guidance for Implementing the 1-hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour NO_2 Significant Impact Level

FROM: Anna Marie Wood, Acting Director /s/
Air Quality Policy Division

TO: Regional Air Division Directors

INTRODUCTION

We are issuing the following guidance to explain and clarify the procedures that may be followed by applicants for Prevention of Significant Deterioration (PSD) permits and permitting authorities reviewing such applications to properly demonstrate that proposed construction will not cause or contribute to a violation of the new 1-hour nitrogen dioxide (NO_2) National Ambient Air Quality Standard (hereinafter, either the 1-hour NO_2 NAAQS or 1-hour NO_2 standard) that became effective on April 12, 2010. EPA revised the primary NO_2 NAAQS by promulgating a 1-hour NO_2 NAAQS to provide the requisite protection of public health. Under section 165(a)(3) of the Clean Air Act (the Act) and sections 52.21(k) and 51.166(k) of EPA's PSD regulations, to obtain a permit, a source must demonstrate that its proposed emissions increase will not cause or contribute to a violation of any NAAQS.

This guidance is intended to: (1) explain the recommended procedures for stakeholders to follow to properly address concerns over high preliminary modeled estimates of ambient NO_2 concentrations that suggest potential violations of the new 1-hour NO_2 standard under some modeling and permitting scenarios; (2) help reduce the burden of modeling for the hourly NO_2 standard where it can be properly demonstrated that a source will not have a significant impact on ambient 1-hour NO_2 concentrations; and (3) identify approaches that allow sources and permitting authorities to mitigate, in a manner consistent with existing regulatory requirements, potential modeled violations of the 1-hour NO_2 NAAQS, where appropriate. Accordingly, the techniques described in this memorandum may be used by permit applicants and permitting authorities to configure projects and permit conditions in order to reasonably conclude that a proposed source's emissions do not cause or contribute to modeled 1-hour NO_2 NAAQS violations so that permits can be issued in accordance with the applicable PSD program requirements.

This guidance discusses existing provisions in EPA regulations and previous guidance for applying those provisions but focuses on the relevancy of this information for implementing the new NAAQS for NO_2. Importantly, however, this guidance also sets forth a recommended interim 1-hour NO_2 significant impact level (SIL) that EPA will use for implementing the federal PSD program, and that states may choose to rely upon to implement their PSD programs for NOx if they agree that these values represent *de minimis* impact levels and incorporate into each permit record a rationale supporting this conclusion. This interim SIL is a useful screening tool that can be used to determine whether or not the emissions from a proposed source will significantly impact hourly NO_2 concentrations, and, if significant impacts are predicted to occur, whether the source's emissions "cause or contribute to" any modeled violations of the new 1-hour NO_2 NAAQS.

BACKGROUND

On April 12, 2010, the new 1-hour NO_2 NAAQS became effective. EPA interprets its regulations at 40 CFR 52.21 (the federal PSD program) to require permit applicants to demonstrate compliance with "any" NAAQS that is in effect on the date a PSD permit is issued. (See, e.g., EPA memo dated April 1, 2010, titled "Applicability of the Federal Prevention of Significant Deterioration Permit Requirements to New and Revised National Ambient Air Quality Standards.") Due to the introduction of a short-term averaging period for the 1-hour NO_2 NAAQS, we anticipate that some stationary sources with relatively short stacks may experience increased difficulty demonstrating that emissions from new construction or modifications will not cause or contribute to a violation of the 1-hour NO_2 NAAQS.

We are responding to reports from stakeholders which indicate that some sources, existing and proposed, are modeling high hourly NO_2 concentrations showing violations of the 1-hour NO_2 NAAQS—based only on the source's projected emissions of NOx under some modeling and permitting scenarios. We find that, in many cases, the modeled violations are resulting from emissions at emergency electric generators and pump stations, where short stacks and limited property rights exist. In other cases, the problem may occur during periods of unit startup, particularly where controls may initially not be in operation. Finally, certain larger sources, including coal-fired and natural gas-fired power plants, refineries, and paper mills could also experience problems in meeting the new 1-hour NO_2 NAAQS using particular modeling assumptions and permit conditions.

We believe that, in some instances, the projected violations result from the use of maximum modeled concentrations that do not adequately take into account the form of the 1-hour standard, and are based on the conservative assumption of 100% NOx-to-NO_2 conversion in the ambient air. To the extent that this is the case, it may be possible to provide more accurate projections of ambient NO_2 concentrations by applying current procedures which account for the statistical form of the 1-hour NO_2 standard, as well as more realistic estimates of the rate of conversion of NOx emissions to ambient NO_2 concentrations. See EPA Memorandum from Tyler Fox, Air Quality Modeling Group, to EPA Regional Air Division Directors, "Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard" (June 28, 2010) for specific modeling guidance for estimating ambient NO_2 concentrations consistent with the new 1-hour NO_2 NAAQS. In addition, where short stacks are currently being used, or are under design, it may be possible to lessen the source's air quality impacts without improper dispersion by implementing "good engineering practice" (GEP) stack heights to increase the height of existing or designed stacks to avoid excessive concentrations due to downwash, as described in the guidance below.

It is EPA's expectation that the guidance in this memorandum and available modeling guidance for NO_2 assist in resolving some of the issues arising from preliminary analyses that are reportedly showing potential exceedances of the new 1-hour NO_2 NAAQS that would not be present under more refined modeling applications. In addition, the techniques described in this memorandum may also help avoid violations of the standard through design of the proposed source or permit conditions, consistent with existing regulatory requirements, which enable the source to demonstrate that its proposed emissions increase will not cause or contribute to a modeled violation of the 1-hour NO_2 standard. Moreover, the interim 1-hour NO_2 SIL that is included in this guidance will provide a reasonable screening tool for efficiently implementing the PSD requirements for an air quality impact analysis.

The following discussion provides guidance concerning demonstrating compliance with the new NAAQS and mitigating modeled violations using air quality-based permit limits more stringent than what the Best Available Control Technology provisions may otherwise require, air quality offsets, the use of GEP stack heights, possible permit conditions for emergency generators, and an interim 1-hour NO_2 SIL.

AIR-QUALITY BASED EMISSIONS LIMITATIONS

Once a level of control required by the Best Available Control Technology provisions is proposed by the PSD applicant, the proposed source's emissions must be modeled at the BACT emissions rate(s) to demonstrate that those emissions will not cause or contribute to a violation of any NAAQS or PSD increment. EPA's 1990 Workshop Manual (page B.54) describes circumstances where a source's emissions based on levels proposed through the top-down process may not be sufficiently controlled to prevent modeled violations of an increment or NAAQS. In such cases, it may be appropriate for PSD applicants to propose a more stringent control option (that is, beyond the level identified via the top-down process) as a result of an adverse impact on the NAAQS or PSD increments.

DEMONSTRATING COMPLIANCE WITH THE NEW NAAQS & MITIGATING MODELED VIOLATIONS WITH AIR QUALITY OFFSETS

A 1988 EPA memorandum provides procedures to follow when a modeled violation is identified during the PSD permitting process. See Memorandum from Gerald A. Emison, EPA OAQPS, to Thomas J. Maslany, EPA Air Management Division, "Air Quality Analysis for Prevention of Significant Deterioration (PSD)." (July 5, 1988). In brief, a reviewing authority may issue a proposed new source or modification a PSD permit only if it can be shown that the proposed project's emissions will not "cause or contribute to" any modeled violations.

To clarify the above statement, in cases where modeled violations of the 1-hour NO_2 NAAQS are predicted, but the permit applicant can show that the NOx emissions increase from the proposed source will not have a significant impact *at the point and time of any modeled violation*, the permitting authority has discretion to conclude that the source's emissions will not contribute to the modeled violation. As provided in the July 5, 1988, guidance memo, in such instances, because of the proposed source's *de minimis* contribution to any modeled violation, the source's impact will not be considered to cause or contribute to such modeled violations, and the permit could be issued. This concept continues to apply, and the significant impact level (described further below) may be used as part of this analysis. A 2006 decision by the EPA Environmental Appeals Board (EAB) provides detailed reasoning that demonstrates the permissibility of finding that a PSD source would not be considered to cause or contribute to a modeled NAAQS violation because its estimated air quality impact was insignificant at the time and place of the modeled violations.[1] See In re *Prairie State Gen. Co.*, 13 E.A.D. ___, ___, PSD Appeal No. 05-05, Slip. Op. at 137-144 (EAB 2006)

However, where it is determined that a source's impact does cause or contribute to a modeled violation, a permit cannot be issued without some action taken to mitigate the source's impact. In accordance with 40 CFR 51.165(b)[2], a major stationary source or major modification (as defined at §51.165(a)(1)(iv) and (v)) that locates in an NO_2 attainment area, but would cause or contribute to a violation of the 1-hour NO_2 NAAQS anywhere may "reduce the impact of its emissions upon air quality by obtaining sufficient emission reductions to, at a minimum, compensate for its adverse ambient [NO_2] impact where the major source or major modification would otherwise cause or contribute to a violation ...." An applicant can meet this requirement for obtaining additional emissions reductions by either reducing its emissions at the source, e.g., promoting more efficient production methodologies and energy efficiency, or by obtaining air quality offsets (see below). See, e.g., In re *Interpower of New York, Inc.*, 5 E.A.D. 130, 141 (EAB 1994).[3] A State may also provide the necessary emissions reductions by imposing emissions limitations on other sources through an approved State Implementation Plan (SIP) revision. These approaches may also be combined as necessary to demonstrate that a source will not cause or contribute to a violation of the NAAQS.

Unlike emissions offset requirements in nonattainment areas, in addressing the air quality offset concept, it may not be necessary for a permit applicant to fully offset the proposed emissions increase if an emissions reduction of lesser quantity will mitigate the adverse air quality impact on a modeled violation. ("Although full emission offsets are not required, such a source must obtain emission offsets sufficient to compensate for its air quality impact where the violation occurs." 44 FR 3274, January 16, 1979, at 3278.) To clarify this, the 1988 guidance memo referred to above states that:

> offsets sufficient to compensate for the source's significant impact must be obtained pursuant to an approved State offset program consistent with State Implementation Plan (SIP) requirements under 40 CFR 51.165(b). Where the source is contributing to an

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[1] While there is no 1-hour NO_2 significant impact level (SIL) currently defined in the PSD regulations, we believe that states may adopt interim values, with the appropriate justification for such values, to use for permitting purposes. In addition, we are recommending an interim SIL as part of this guidance for implementing the NO_2 requirements in the federal PSD program, and in state programs where states choose to use it.

[2] The same provision is contained in EPA's Interpretative Ruling at 40 CFR part 51 Appendix S, section III.

[3] In contrast to Nonattainment New Source Review permits, offsets are not mandatory requirements in PSD permits if it can otherwise be demonstrated that a source will not cause or contribute to a violation of the NAAQS. See, In re *Knauf Fiber Glass, GMBH*, 8 E.A.D. 121, 168 (EAB 1999).

existing violation, the required offset may not correct the violation. Such existing violations must be addressed [through the SIP].

In addition, in order to determine the appropriate emissions reductions, the applicant and permitting authority should take into account modeling procedures for the form of the 1-hour standard and for the appropriate NOx-NO_2 conversion rate that applies in the area of concern. As part of this process, existing ambient ozone concentrations and other meteorological conditions in the area of concern may need to be considered. Note that additional guidance for this and other aspects of the modeling analysis for the impacts of NOx emissions on ambient concentrations of NO_2 are addressed in EPA modeling guidance, including the June 28, 2010, Memorandum titled, "Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard."

"GOOD ENGINEERING PRACTICE" STACK HEIGHT & DISPERSION TECHNIQUES

If a permit applicant is unable to show that the source's proposed emissions increase will not cause or contribute to a modeled violation of the new 1-hour NO_2 NAAQS, the problem could be the result of plume downwash effects which may cause high ambient concentrations near the source. In such cases, a source may be able to raise the height of its existing stacks (or designed stacks if not yet constructed) to a GEP stack height of at least 65 meters, measured from the ground-level elevation at the base of the stack.

While not necessarily totally eliminating the effects of downwash in all cases, raising stacks to GEP height may provide substantial air quality benefits in a manner consistent with statutory provisions (section 123 of the Act) governing acceptable stack heights to minimize extensive concentrations due to atmospheric downwash, eddies or wakes. Permit applicants should also be aware of the regulatory restrictions on stack heights for the purpose of modeling for compliance with NAAQS and increments. Section 52.21(h) of the PSD regulations currently prohibits the use of dispersion techniques, such as stack heights above GEP, merged gas streams, or intermittent controls for setting NOx emissions limits or to meet the annual and 1-hour NAAQS and annual NO_2 increments. However, stack heights in existence before December 31, 1970, and dispersion techniques implemented before then, are not affected by these limitations. EPA's general stack height regulations are promulgated at 40 CFR 51.100(ff), (gg), (hh), (ii), (jj), (kk) and (nn), and 40 CFR 51.118.

a. *Stack heights*: A source cannot take credit for that portion of a stack height in excess of the GEP height when modeling to develop the NOx emissions limitations or to determine source compliance with the annual and 1-hour NO_2 NAAQS. It should be noted, however, that this limitation does not limit the actual height of any stack constructed by a new source or modification.

The following limitations apply in accordance with §52.21(h):

- For a stack height less than GEP, the actual stack height must be used in the source impact analysis for NOx emissions;

- For a stack height equal to or greater than 65 meters, the impact on NOx emission limits may be modeled using the greater of:
  - A *de minimis* stack height equal to 65 meters, as measured from the ground-level elevation at the base of the stack, without demonstration or calculation (40 CFR 51.100(ii)(1));
  - The refined formula height calculated using the dimensions of nearby structures in accordance with the following equation:

  GEP = H + 1.5L, where H is the height of the nearby structure and L is the lesser dimension of the height or projected width of the nearby structure (40 CFR 51.100(ii)(2)(ii)).[4]

- A GEP stack height exceeding the refined formula height may be approved when it can be demonstrated to be necessary to avoid "excessive concentrations" of NO_2 caused by atmospheric downwash, wakes, or eddy effects by the source, nearby structures, or nearby terrain features.
  (40 CFR 51.100(ii)(3), (jj), (kk));

- For purposes of PSD (and NOx/NO_2), "excessive concentrations" means a maximum ground-level concentration of NO_2 due to NOx emissions from a stack due in whole or in part to downwash, wakes, and eddy effects produced by nearby structures or nearby terrain features which individually is at least 40 percent in excess of the maximum NO_2 concentration experienced in the absence of such effects and (a) which contributes to a total NO_2 concentration due to emissions from all sources that is greater than the annual or 1-hour NO_2 NAAQS or (b) greater than the PSD (annual) increment for NO_2.
  (40 CFR 51.100(kk)(1)).

Reportedly, for economic and other reasons, many existing source stacks have been constructed at heights less than 65 meters, and source impact analyses may show that the source's emissions will cause or contribute to a modeled violation of the annual or 1-hour NO_2 NAAQS. Where this is the case, sources should be aware that they can increase their stack heights up to 65 meters without a GEP demonstration.

b. *Other dispersion techniques*: The term "dispersion technique" includes any practice carried out to increase final plume rise, subject to certain exceptions (40 CFR 51.100(hh)(1)(iii), (2)(i) – (v)). Beyond the noted exceptions, such techniques are not allowed for getting credit for modeling source compliance with the annual and 1-hour NO_2 NAAQS and annual NO_2 increment.

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[4] For stacks in existence on January 12, 1979, the GEP equation is GEP = 2.5 H (provided the owner or operator produces evidence that this equation was actually relied on in establishing an emission limitation for NOx (40 CFR 51.100(ii)(2)(i)

OPERATION OF EMERGENCY EQUIPMENT & GENERAL STARTUP CONDITIONS

In determining an emergency generator's potential to emit, existing guidance (EPA memo titled "Calculating Potential to Emit (PTE) for Emergency Generators," September 6, 1995) allows a default value of 500 hours "for estimating the number of hours that an emergency generator could be expected to operate under worst-case conditions." The guidance also allows for alternative estimates to be made on a case-by-case basis for individual emergency generators. This time period must also consider operating time for both testing/maintenance as well as for emergency utilization. Likewise, existing EPA policy does not allow NOx emissions to be excluded from the source impact analysis (NAAQS and increments) when the emergency equipment is operating during an emergency. EPA provides no exemption from compliance with the NAAQS during periods of emergency operation. Thus, it is not sufficient to consider only emissions generated during periods of testing/maintenance in the source impact analysis.

If during an emergency, emergency equipment is never operated simultaneously with other emissions units at the source that the emergency equipment will back up, a worst-case hourly impact analysis may very well occur during periods of normal source operation when other emissions units at the facility are likely to be operating simultaneously with the scheduled testing of emergency equipment. To avoid such worst-case modeling situations, a permit applicant may commit to scheduling the testing of emergency equipment during times when the source is not otherwise operating, or during known off-peak operating periods. This could provide a basis to justify not modeling the 1-hour impacts of the emergency equipment under conditions that would include simultaneous operation with other onsite emissions units. Accordingly, permits for emergency equipment may include enforceable conditions that specifically limit the testing/maintenance of emergency equipment to certain periods of time (seasons, days of the week, hours of the day, etc.) as long as these limitations do not constitute dispersion techniques under 40 CFR 51.1(hh)(1)(ii).

We also note that similar problems associated with the modeling of high 1-hour NO_2 concentrations have been reported to occur during startup periods for certain kinds of emissions units—often because control equipment cannot function during all or a portion of the startup process. EPA currently has no provisions for exempting emissions occurring during equipment startups from the air quality analysis to demonstrate compliance with the NAAQS. Startup emissions may occur during only a relatively small portion of the unit's total annual operating schedule; however, they must be included in the required PSD air quality analysis for the NAAQS. Sources may be willing to accept enforceable permit conditions limiting equipment startups to certain hours of the day when impacts are expected to be lower than normal. Such permit limitations can be accounted for in the modeling of such emissions. Applicants should direct other questions arising concerning procedures for modeling startup emissions to the applicable permitting authority to determine the most current modeling guidance.

SCREENING VALUES

In the final rule establishing the hourly NO_2 standard, EPA discussed various implementation considerations for the PSD permitting program. 75 FR.6474, 6524 (Feb. 9, 2010). This discussion included the following statements regarding particular screening values that have historically been used on a widespread basis to facilitate implementation of the PSD permitting program:

> We also believe that there may be a need to revise the screening tools currently used under the NSR/PSD program for completing NO_2 analyses. These screening tools include the significant impact levels (SILs), as mentioned by one commenter, but also include the significant emissions rate for emissions of NOx and the significant monitoring concentration (SMC) for NO_2. EPA intends to evaluate the need for possible changes or additions to each of these important screening tools for NOx/NO_2 due to the addition of a 1-hour NO_2 NAAQS. If changes or additions are deemed necessary, EPA will propose any such changes for public notice and comment in a separate action. 75 FR 6525.

EPA intends to conduct an evaluation of these issues and submit our findings in the form of revised significance levels under notice and comment rulemaking if any revisions are deemed appropriate. In the interim, for the reasons provided below, we recommend the continued use of the existing significant emissions rates (SER) for NOx emissions as well as an interim 1-hour NO_2 SIL that we are setting forth today for conducting air quality impact analyses for the 1-hour NO_2 NAAQS. As described in the section titled Introduction, EPA intends to implement the interim 1-hour NO_2 SIL contained herein under the federal PSD program and offers states the opportunity to use it in their PSD programs if they choose to do so. EPA is not addressing the significant monitoring concentrations in this memorandum.

SIGNIFICANT EMISSIONS RATE

Under the terms of existing EPA regulations, the applicable significant emissions rate for nitrogen oxides is 40 tons per year. 40 CFR 52.21(b)(23); 40 CFR 51.166(b)(23). The significant emissions rates defined in those regulations are specific to individual pollutants but are not differentiated by the averaging times of the air quality standards applicable to some of the listed pollutants. Although EPA has not previously promulgated a NO_2 standard using an averaging time of less than one year, the NAAQS for SO_2 have included standards with 3-hour and 24-hour averaging times for many years. EPA has applied the 40 tons per year significant emissions rate for SO_2 across all of these averaging times. Until the evaluation described above and any associated rulemaking is completed, EPA does not believe it has cause to apply the NO_2 significant emissions rate any differently than EPA has historically applied the SO_2 significant emissions rate and others that apply to standards with averaging times less than 1 year.

Under existing regulations, an ambient air quality impact analysis is required for "each pollutant that [a source] would have the potential to emit in significant amounts." 40 CFR 52.21(m)(1)(i)(a); 40 CFR. 51.166(m)(1)(i)(a). For modifications, these regulations require this analysis for "each pollutant for which [the modification] would result in a significant net emissions increase." 40 CFR.52.21(m)(1)(i)(b); 40 CFR.51.166(m)(1)(i)(b). EPA construes this regulation to mean that an ambient impact analysis is not necessary for pollutants with emissions rates below the significant emissions rates in paragraph (b)(23) of the regulations. No additional action by EPA or permitting authorities is necessary at this time to apply the 40 tpy significant emissions rate in existing regulations to the hourly NO_2 standard.

INTERIM 1-HOUR NO_2 SIGNIFICANT IMPACT LEVEL

A significant impact level (SIL) serves as a useful screening tool for implementing the PSD requirements for an air quality analysis. The primary purpose of the SIL is to serve as a screening tool to identify a level of ambient impact that is sufficiently low relative to the NAAQS or PSD increments such that the impact can be considered trivial or *de minimis*. Hence, the EPA considers a source whose individual impact falls below a SIL to have a *de minimis* impact on air quality concentrations that already exist. Accordingly, a source that demonstrates that the projected ambient impact of its proposed emissions increase does not exceed the SIL for that pollutant at a location where a NAAQS or increment violation occurs is not considered to cause or contribute to that violation. In the same way, a source with a proposed emissions increase of a particular pollutant that will have a significant impact at some locations is not required to model at distances beyond the point where the impact of its proposed emissions is below the SILs for that pollutant. When a proposed source's impact by itself is not considered to be "significant," EPA has long maintained that any further effort on the part of the applicant to complete a cumulative source impact analysis involving other source impacts would only yield information of trivial or no value with respect to the required evaluation of the proposed source or modification. The concept of a SIL is grounded on the *de minimis* principles described by the court in *Alabama Power Co. v. Costle*, 636 F.2d 323, 360 (D.C. Cir. 1980); See also *Sur Contra La Contaminacion v. EPA*, 202 F.3d 443, 448-49 (1st Cir. 2000) (upholding EPA's use of SIL to allow permit applicant to avoid full impact analysis); *In re: Prairie State Gen. Co.*, PSD Appeal No. 05-05, Slip. Op. at 139 (EAB 2006)

EPA has codified several SILs into regulations at 40 CFR 51.165(b). EPA plans to undertake rulemaking to develop a 1-hour NO_2 SIL for the new NAAQS for NO_2. However, EPA has recognized that the absence of an EPA-promulgated SIL does not preclude permitting authorities from developing interim SILs for use in demonstrating that a cumulative air quality analysis would yield trivial gain. Response to Comments, Implementation of New Source Review (NSR) Program for Particulate Matter Less Than 2.5 Micrometers in Diameter ($PM_{2.5}$), pg. 82 (March 2008) [EPA-HQ-OAR-2003-0062-0278].

Until such time as a 1-hour NO_2 SIL is defined in the PSD regulations, we are herein providing a recommended interim SIL that we intend to use as a screening tool for completing the required air quality analyses for the new 1-hour NO_2 under the federal PSD program at 40 CFR 52.21. To support the application of this interim SIL in each instance, a permitting authority that utilizes this SIL as part of an ambient air quality analysis should include in the permit record the analysis reflected in this memorandum and the referenced documents to demonstrate that an air quality impact at or below the SIL is *de minimis* in nature and would not cause a violation of the NAAQS.

Using the interim 1-hour NO_2 SIL, the permit applicant and permitting authority can determine: (1) whether, based on the proposed increase in NOx emissions, a cumulative air quality analysis is required; (2) the area of impact within which a cumulative air quality analysis should focus; and (3) whether, as part of a cumulative air quality analysis, the proposed source's NOx emissions will cause or contribute to a modeled violation of the 1-hour NO_2 NAAQS.

In this guidance, EPA recommends an interim 1-hour NO_2 SIL value of 4 ppb. To determine initially whether a proposed project's emissions increase will have a significant impact (resulting in the need for a cumulative air quality analysis), this interim SIL should be compared to either of the following:

- The highest of the 5-year averages of the maximum modeled 1-hour NO_2 concentrations predicted each year at each receptor, based on 5 years of National Weather Service data; or
- The highest modeled 1-hour NO_2 concentration predicted across all receptors based on 1 year of site-specific meteorological data, or the highest of the multi-year averages of the maximum modeled 1-hour NO_2 concentrations predicted each year at each receptor, based on 2 or more, up to 5 complete years of available site-specific meteorological data.

Additional guidance will be forthcoming for the purpose of comparing a proposed source's modeled impacts to the interim 1-hour NO_2 SIL in order to make a determination about whether that source's contribution is significant when a cumulative air quality analysis identifies violations of the 1-hour NO_2 NAAQS (i.e., "causes or contributes to" a modeled violation).

We derived this interim 1-hour NO_2 SIL by using an impact equal to 4% of the 1-hour NO_2 NAAQS (which is 100 ppb). We have chosen this approach because we believe it is reasonable to base the interim 1-hour NO_2 SIL directly on consideration of impacts relative to the 1-hour NO_2 NAAQS. In 1980, we defined SER for each pollutant subject to PSD. 45 FR 52676, August 7, 1980 at 52705-52710. For PM and SO_2, we defined the SER as the emissions rate that resulted in an ambient impact equal to 4% of the applicable short-term NAAQS. The 1980 analysis focused on levels no higher than 5% of the primary standard because of concerns that higher levels were found to result in unreasonably large amounts of increment being consumed by a single source. Within the range of impacts analyzed, we considered two factors that had an important influence on the choice of *de minimis* emissions levels: (1) cumulative effect on increment consumption of multiple sources in an area, each making the maximum *de minimis* emissions increase; and (2) the projected consequence of a given *de minimis* level on administrative burden. As explained in the preamble to the 1980 rulemaking and the supporting documentation,[5] EPA decided to use 4% of the 24-hour primary NAAQS for PM and SO_2 to define the significant emissions rates (SERs) for those pollutants. It was noted that, at the time, only an annual NO_2 NAAQS existed. Thus, for reasons explained in the 1980 preamble, to define the SER for NOx emissions we used a design value of 2% of the annual NO_2 NAAQS. See 45 FR 52708. Looking now at a short-term NAAQS for NO_2, we believe that it is reasonable as an interim approach to use a SIL value that represents 4% of the 1-hour NO_2

[5] EPA evaluated de minimis levels for pollutants for which NAAQS had been established in a document titled "Impact of Proposed and Alternative De Minimis Levels for Criteria Pollutants"; EPA-450/2-80-072, June 1980.

NAAQS. EPA will consider other possible alternatives for developing a 1-hour NO_2 SIL in a future rulemaking that will provide an opportunity for public participation in the development of a SIL as part of the PSD regulations.

Several state programs have already adopted interim 1-hour NO_2 SILs that differ (both higher and lower) from the interim value being recommended herein. The EPA-recommended interim 1-hour NO_2 SIL is not intended to supersede any interim SIL that is now or may be relied upon to implement a state PSD program that is part of an approved SIP, or to impose the use of the SIL concept on any state that chooses to implement the PSD program—in particular the ambient air quality analysis—without using a SIL as a screening tool. Accordingly, states that implement the PSD program under an EPA-approved SIP may choose to use this interim SIL, another value that may be deemed more appropriate for PSD permitting purposes in the state of concern, or no SIL at all. The application of any SIL that is not reflected in a promulgated regulation should be supported by a record in each instance that shows the value represents a *de minimis* impact on the 1-hour NO_2 standard, as described above.

In the event of questions regarding the general implementation guidance contained in this memorandum, please contact Raj Rao (rao.raj@epa.gov).

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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June 28, 2010

MEMORANDUM

SUBJECT: Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard

FROM: Tyler Fox, Leader
Air Quality Modeling Group, C439-01

TO: Regional Air Division Directors

INTRODUCTION

On January 22, 2010, EPA announced a new 1-hour nitrogen dioxide (NO_2) National Ambient Air Quality Standard (1-hour NO_2 NAAQS or 1-hour NO_2 standard) which is attained when the 3-year average of the 98th-percentile of the annual distribution of daily maximum 1-hour concentrations does not exceed 100 ppb at each monitor within an area. The final rule for the new 1-hour NO_2 NAAQS was published in the Federal Register on February 9, 2010 (75 FR 6474-6537), and the standard became effective on April 12, 2010 (EPA, 2010a). This memorandum clarifies the applicability of current guidance in the *Guideline on Air Quality Models* (40 CFR Part 51, Appendix W) for modeling NO_2 impacts in accordance with the Prevention of Significant Deterioration (PSD) permit requirements to demonstrate compliance with the new 1-hour NO_2 standard.

SUMMARY OF CURRENT GUIDANCE

While the new 1-hour NAAQS is defined relative to ambient concentrations of NO_2, the majority of nitrogen oxides (NOx) emissions for stationary and mobile sources are in the form of nitric oxide (NO) rather than NO_2. Appendix W notes that the impact of an individual source on ambient NO_2 depends, in part, "on the chemical environment into which the source's plume is to be emitted" (see Section 5.1.j). Given the role of NOx chemistry in determining ambient impact levels of NO_2 based on modeled NOx emissions, Section 5.2.4 of Appendix W recommends the following three-tiered screening approach for NO_2 modeling for annual averages:

- Tier 1 - assume full conversion of NO to NO_2 based on application of an appropriate refined modeling technique under Section 4.2.2 of Appendix W to estimate ambient NOx concentrations;
- Tier 2 - multiply Tier 1 result by empirically-derived NO_2/NOx ratio, with 0.75 as the annual national default ratio (Chu and Meyer, 1991); and

- Tier 3 - detailed screening methods may be considered on a case-by-case basis, with the Ozone Limiting Method (OLM) identified as a detailed screening technique for point sources (Cole and Summerhays, 1979).

Tier 2 is often referred to as the Ambient Ratio Method, or ARM. Site-specific ambient NO_2/NOx ratios derived from appropriate ambient monitoring data may also be considered as detailed screening methods on a case-by-case basis, with proper justification. Consistent with Section 4.2.2, AERMOD is the current preferred model for "a wide range of regulatory applications in all types of terrain" for purposes of estimating ambient concentrations of NO_2, based on NOx emissions, under Tiers 1 and 2 above. We discuss the role of AERMOD for Tier 3 applications in more detail below.

APPLICABILITY OF CURRENT GUIDANCE TO 1-HOUR NO_2 NAAQS

In general, the Appendix W recommendations regarding the annual NO_2 standard are also applicable to the new 1-hour NO_2 standard, but additional issues may need to be considered in the context of a 1-hour standard, depending on the characteristics of the emission sources, and depending on which tier is used, as summarized below:

- Tier 1 applies to the 1-hour NO_2 standard without any additional justification;
- Tier 2 may also apply to the 1-hour NO_2 standard in many cases, but some additional consideration will be needed in relation to an appropriate ambient ratio for peak hourly impacts since the current default ambient ratio is considered to be representative of "area wide quasi-equilibrium conditions"; and
- Tier 3 "detailed screening methods" will continue to be considered on a case-by-case basis for the 1-hour NO_2 standard. However, certain input data requirements and assumptions for Tier 3 applications may be of greater importance for the 1-hour standard than for the annual standard given the more localized nature of peak hourly vs. annual impacts. In addition, use of site-specific ambient NO_2/NOx ratios based on ambient monitoring data will generally be more difficult to justify for the 1-hour NO_2 standard than for the annual standard.

While Appendix W specifically mentions OLM as a detailed screening method under Tier 3, we also consider the Plume Volume Molar Ratio Method (PVMRM) (Hanrahan, 1999a) discussed under Section 5.1.j of Appendix W to be in this category at this time. Both of these options account for ambient conversion of NO to NO_2 in the presence of ozone, based on the following basic chemical mechanism, known as titration, although there are important differences between these methods:

$$NO + O_3 \rightarrow NO_2 + O_2 \qquad \text{(Eq. 1)}$$

As noted in Section 5.1.j, EPA is currently testing the PVMRM option to determine its suitability as a refined method. Limited evaluations of PVMRM have been completed, which show encouraging results, but the amount of data currently available is too limited to justify a designation of PVMRM as a refined method for NO_2 (Hanrahan, 1999b; MACTEC, 2005). EPA is currently updating and extending these evaluations to examine model performance for predicting hourly NO_2 concentrations, including both the OLM and PVMRM options, and results of these additional evaluations will be provided at a later date. A sensitivity analysis of the OLM and PVMRM options in AERMOD has been conducted that compares modeled concentrations based on OLM and PVMRM with Tiers 1 and 2 for a range of source characteristics (MACTEC, 2004). This analysis serves as a useful reference to understand how ambient NO_2 concentrations may be impacted by application of this three-tiered screening approach, and includes comparisons for both annual average and maximum 1-hour NO_2 concentrations.

Key model inputs for both the OLM and PVMRM options are the in-stack ratios of NO_2/NOx emissions and background ozone concentrations. While the representativeness of these key inputs is important in the context of the annual NO_2 standard, they will generally take on even greater importance for the new 1-hour NO_2 standard, as explained in more detail below. Recognizing the potential importance of the in-stack NO_2/NOx ratio for hourly NO_2 compliance demonstrations, we recommend that in-stack ratios used with either the OLM or PVMRM options be justified based on the specific application, i.e., there is no "default" in-stack NO_2/NOx ratio for either OLM or PVMRM.

The OLM and PVMRM methods are both available as non-regulatory-default options within the EPA-preferred AERMOD dispersion model (Cimorelli, *et al.*, 2004; EPA, 2004; EPA, 2009). As a result of their non-regulatory-default status, pursuant to Sections 3.1.2.c, 3.2.2.a, and A.1.a(2) of Appendix W, application of AERMOD with the OLM or PVMRM option is no longer considered a "preferred model" and, therefore, requires justification and approval by the Regional Office on a case-by-case basis. While EPA is continuing to evaluate the PVMRM and OLM options within AERMOD for use in compliance demonstrations for the 1-hour NO_2 standard, as long as they are considered to be non-regulatory-default options, their use as alternative modeling techniques under Appendix W should be justified in accordance with Section 3.2.2, paragraph (e), as follows:

"e. Finally, for condition (3) in paragraph (b) of this subsection [preferred model is less appropriate for the specific application, or there is no preferred model], an alternative refined model may be used provided that:

i. The model has received a scientific peer review;
ii. The model can be demonstrated to be applicable to the problem on a theoretical basis;
iii. The data bases which are necessary to perform the analysis are available and adequate;
iv. Appropriate performance evaluations of the model have shown that the model is not biased toward underestimates; and
v. A protocol on methods and procedures to be followed has been established."

Since AERMOD is the preferred model for dispersion for a wide range of application, the focus of the alternative model demonstration for use of the OLM and PVMRM options within AERMOD is on the treatment of NOx chemistry within the model, and does not need to address basic dispersion algorithms within AERMOD. Furthermore, items i and iv of the alternative model demonstration for these options can be fulfilled in part based on existing documentation (Cole and Summerhays, 1979; Hanrahan, 1999a; Hanrahan, 1999b; MACTEC, 2005), and the remaining items should be routinely addressed as part of the modeling protocol, irrespective of the regulatory status of these options. The issue of applicability to the problem on a theoretical basis (item ii) is a case-by-case determination based on an assessment of the adequacy of the ozone titration mechanism utilized by these options to account for NOx chemistry within the AERMOD model based on "the chemical environment into which the source's plume is to be emitted" (Appendix W, Section 5.1.j). The adequacy of available data bases needed for application of OLM and PVMRM (item iii), including in-stack NO_2/NOx ratios and background ozone concentrations, is a critical aspect of the demonstration which we discuss in more detail below. It should also be noted that application of the OLM or PVMRM methods with other Appendix W models or alternative models, whether as a separate post-processor or integrated within the model, would require additional documentation and demonstration that the methods have been implemented and applied appropriately within that context, including model-specific performance evaluations which satisfy item iv under Section 3.2.2.e.

Given the form of the new 1-hour NO_2 standard, some clarification is needed regarding the appropriate data periods for modeling demonstrations of compliance with the NAAQS vs. demonstrations of attainment of the NAAQS through ambient monitoring. While monitored design values for the 1-hour NO_2 standard are based on a 3-year average (in accordance with Section 1(c)(2) of Appendix S to 40 CFR Part 50), Section 8.3.1.2 of Appendix W addresses the length of the meteorological data record for dispersion modeling, stating that "[T]he use of 5 years of NWS [National Weather Service] meteorological data or at least 1 year of site specific data is required." Section 8.3.1.2.b further states that "one year or more (including partial years), up to five years, of site specific data . . . are preferred for use in air quality analyses." Although the monitored design value for the 1-hour NO_2 standard is defined in terms of the 3-year average, this definition does not preempt or alter the Appendix W requirement for use of 5 years of NWS meteorological data or at least 1 year of site specific data. The 5-year average based on use of NWS data, or an average across one or more years of available site specific data, serves as an unbiased estimate of the 3-year average for purposes of modeling demonstrations of compliance with the NAAQS. Modeling of "rolling 3-year averages," using years 1 through 3, years 2 through 4, and years 3 through 5, is not required. Furthermore, since modeled results for NO_2 are averaged across the number of years modeled for comparison to the new 1-hour NO_2 standard, the meteorological data period should include complete years of data to avoid introducing a seasonal bias to the averaged impacts. In order to comply with Appendix W recommendations in cases where partial years of site specific meteorological data are available, while avoiding any seasonal bias in the averaged impacts, an approach that utilizes the most conservative modeling result based on the first complete-year period of the available data record vs. results based on the last complete-year period of available data may be appropriate, subject to approval by the appropriate reviewing authority. Such an approach would ensure that all available site specific data are accounted for in the modeling analysis without imposing an undue burden on the applicant and avoiding arbitrary choices in the selection of a single complete-year data period.

The form of the new 1-hour NO_2 standard also has implications regarding appropriate methods for combining modeled ambient concentrations with monitored background concentrations for comparison to the NAAQS in a cumulative modeling analysis. As noted in the March 23, 2010 memorandum regarding "Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS" (EPA, 2010b), combining the 98^{th} percentile monitored value with the 98^{th} percentile modeled concentrations for a cumulative impact assessment could result in a value that is below the 98^{th} percentile of the combined cumulative distribution and would, therefore, not be protective of the NAAQS. However, unlike the recommendations presented for $PM_{2.5}$, the modeled contribution to the cumulative ambient impact assessment for the 1-hour NO_2 standard should follow the form of the standard based on the 98^{th} percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled. A "first tier" assumption that may be applied without further justification is to add the overall highest hourly background NO_2 concentration from a representative monitor to the modeled design value, based on the form of the standard, for comparison to the NAAQS. Additional refinements to this "first tier" approach based on some level of temporal pairing of modeled and monitored values may be considered on a case-by-case basis, with adequate justification and documentation.

DISCUSSION OF TECHNICAL ISSUES

While many of the same technical issues related to application of Appendix W guidance for an annual NO_2 standard would also apply in the context of the new 1-hour NO_2 standard, there are some important differences that may also need to be considered depending on the specific application. This section discusses several aspects of these technical issues related to the new 1-hour NO_2 NAAQS, including a discussion of source emission inventories required for modeling demonstrations of compliance with the NAAQS and other issues specific to each of the three tiers identified in Section 5.2.4 of Appendix W for NO_2 modeling.

Emission Inventories

The source emissions data are a key input for all modeling analyses and one that may require additional considerations under the new 1-hour NO_2 standard is the source emissions data. Section 8.1 of Appendix W provides guidance regarding source emission input data for dispersion modeling and Table 8-2 summarizes the recommendations for emission input data that should be followed for NAAQS compliance demonstrations. Although existing NOx emission inventories used to support modeling for compliance with the annual NO_2 standard should serve as a useful starting point, such inventories may not always be adequate for use in assessing compliance with the new 1-hour NO_2 standard since some aspects of the guidance in Section 8.1 differs for long-term (annual and quarterly) standards vs. short-term ($\leq$ 24 hours) standards. In particular, since maximum ground-level concentrations may be more sensitive to operating levels and startup/shutdown conditions for an hourly standard than for an annual standard, emission rates and stack parameters associated with the maximum ground-level concentrations for the annual standard may underestimate maximum concentrations for the new 1-hour NO_2 standard. Due to the importance of in-stack NO_2/NOx ratios required for application of the OLM and PVMRM options within AERMOD discussed above, consideration should also be given to the potential variability of in-stack NO_2/NOx ratios under different operating conditions when those non-regulatory-default options are applied. We also note that source emission input data recommendations in Table 8-2 of Appendix W for "nearby sources" and "other sources" that may be needed to conduct a cumulative impact assessment include further differences between emission data for long-term vs. short-term standards which could also affect the adequacy of existing annual NOx emission inventories for the new 1-hour NO_2 standard. The terms "nearby sources" and "other sources" used in this context are defined in Section 8.2.3 of Appendix W. Attachment A provides a more detailed discussion on determining NOx emissions for permit modeling.

While Section 8.2.3 of Appendix W emphasizes the importance of professional judgment by the reviewing authority in the identification of nearby and other sources to be included in the modeled emission inventory, Appendix W establishes "a significant concentration gradient in the vicinity of the source" under consideration as the main criterion for this selection. Appendix W also indicates that "the number of such [nearby] sources is expected to be small except in unusual situations." See Section 8.2.3.b. Since concentration gradients will vary somewhat depending on the averaging period being modeled, especially for an annual vs. 1-hour standard, the criteria for selection of "nearby" and "other" sources for inclusion in the modeled inventory may need to be reassessed for the 1-hour NO_2 standard.

The representativeness of available ambient air quality data also plays an important role in determining which nearby sources should be included in the modeled emission inventory. Key issues to consider in this regard are the extent to which ambient air impacts of emissions from nearby sources are reflected in the available ambient measurements, and the degree to which emissions from those background sources during the monitoring period are representative of allowable emission levels under the existing permits. The professional judgments that are required in developing an appropriate inventory of background sources should strive toward the proper balance between adequately characterizing the potential for cumulative impacts of emission sources within the study area to cause or contribute to violations of the NAAQS, while minimizing the potential to overestimate impacts by double-counting of modeled source impacts that are also reflected in the ambient monitoring data. We would also caution against the literal and uncritical application of very prescriptive procedures for identifying which background sources should be included in the modeled emission inventory for NAAQS compliance demonstrations, such as those described in Chapter C, Section IV.C.1 of the draft *New Source Review Workshop Manual* (EPA, 1990), noting again that Appendix W emphasizes the importance of professional judgment in this process. While the draft workshop manual serves as a useful general reference regarding New Source Review (NSR) and PSD programs, and such procedures may play a useful role in defining the spatial extent of sources whose emissions may need to be considered, it should be recognized that "[i]t is not intended to be an official statement of policy and standards and does not establish binding regulatory requirements." See, Preface.

Given the range of issues involved in the determination of an appropriate inventory of emissions to include in a cumulative impact assessment, the appropriate reviewing authority should be consulted early in the process regarding the selection and proper application of appropriate monitored background concentrations and the selection and appropriate characterization of modeled background source emission inventories for use in demonstrating compliance with the new 1-hour NO_2 standard.

Tier-specific Technical Issues

This section discusses technical issues related to application of each tier in the three-tiered screening approach for NO_2 modeling recommended in Section 5.2.4 Appendix W. A basic understanding of NOx chemistry and "of the chemical environment into which the source's plume is to be emitted" (Appendix W, Section 5.1.j) will be helpful for addressing these issues based on the specific application.

Tier 1:

Since the assumption of full conversion of NO to NO_2 will provide the most conservative treatment of NOx chemistry in assessing ambient impacts, there are no technical issues associated with treatment of NOx chemistry for this tier. However, the general issues related to emission inventories for the 1-hour NO_2 standard discussed above and in Attachment A apply to Tier 1.

Tier 2:

As noted above, the 0.75 national default ratio for ARM is considered to be representative of "area wide quasi-equilibrium conditions" and, therefore, may not be as appropriate for use with the 1-hour NO_2 standard. The appropriateness of this default ambient ratio will depend somewhat on the characteristics of the sources, and as such application of Tier 2 for 1-hour NO_2 compliance demonstrations may need to be considered on a source-by-source basis in some cases. The key technical issue to address in relation to this tier requires an understanding of the meteorological conditions that are likely to be associated with peak hourly impacts from the source(s) being modeled. In general, for low-level releases with limited plume rise, peak hourly NOx impacts are likely to be associated with nighttime stable/light wind conditions. Since ambient ozone concentrations are likely to be relatively low for these conditions, and since low wind speeds and stable atmospheric conditions will further limit the conversion of NO to NO_2 by limiting the rate of entrainment of ozone into the plume, the 0.75 national default ratio will likely be conservative for these cases. A similar rationale may apply for elevated sources where plume impaction on nearby complex terrain under stable atmospheric conditions is expected to determine the peak hourly NOx concentrations. By contrast, for elevated sources in relatively flat terrain, the peak hourly NOx concentrations are likely to occur during daytime convective conditions, when ambient ozone concentrations are likely to be relatively high and entrainment of ozone within the plume is more rapid due to the vigorous vertical mixing during such conditions. For these sources, the 0.75 default ratio may not be conservative, and some caution may be needed in applying Tier 2 for such sources. We also note that the default equilibrium ratio employed within the PVMRM algorithm as an upper bound on an hourly basis is 0.9.

Tier 3:

This tier represents a general category of "detailed screening methods" which may be considered on a case-by-case basis. Section 5.2.4(b) of Appendix W cites two specific examples of Tier 3 methods, namely OLM and the use of site-specific ambient NO_2/NOx ratios supported by ambient measurements. As noted above, we also believe it is appropriate to consider the

PVMRM option as a Tier 3 detailed screening method at this time. The discussion here focuses primarily on the OLM and PVMRM methods, but we also note that the use of site-specific ambient NO_2/NOx ratios will be subject to the same issues discussed above in relation to the Tier 2 default ARM, and as a result it will generally be much more difficult to determine an appropriate ambient NO_2/NOx ratio based on monitoring data for the new 1-hour NO_2 standard than for the annual standard.

While OLM and PVMRM are both based on the same simple chemical mechanism of titration to account for the conversion of NO emissions to NO_2 (see Eq. 1) and therefore entail similar technical issues and considerations, there are some important differences that also need to be considered when assessing the appropriateness of these methods for specific applications. While the titration mechanism may capture the most important aspects of NO-to-NO_2 conversion in many applications, both methods will suffer from the same limitations for applications in which other mechanisms, such as photosynthesis, contribute significantly to the overall process of chemical transformation. Sources located in areas with high levels of VOC emissions may be subject to these limitations of OLM and PVMRM. Titration is generally a much faster mechanism for converting NO to NO_2 than photosynthesis, and as such is likely to be appropriate for characterizing peak 1-hour NO_2 impacts in many cases.

Both OLM and PVMRM rely on the same key inputs of in-stack NO_2/NOx ratios and hourly ambient ozone concentrations. Although both methods can be applied within the AERMOD model using a single "representative" background ozone concentration, it is likely that use of a single value would result in very conservative estimates of peak hourly ambient concentrations since its use for the 1-hour NO_2 standard would be contingent on a demonstration of conservatism for all hours modeled. Furthermore, hourly monitored ozone concentrations used with the OLM and PVMRM options must be concurrent with the meteorological data period used in the modeling analysis, and thus the temporal representativeness of the ozone data for estimating ambient NO_2 concentrations could be a factor in determining the appropriateness of the meteorological data period for a particular application. As noted above, the representativeness of these key inputs takes on somewhat greater importance in the context of a 1-hour NO_2 standard than for an annual standard, for obvious reasons. In the case of hourly background ozone concentrations, methods used to substitute for periods of missing data may play a more significant role in determining the 1-hour NO_2 modeled design value, and should therefore be given greater scrutiny, especially for data periods that are likely to be associated with peak hourly concentrations based on meteorological conditions and source characteristics. In other words, ozone data substitution methods that may have been deemed appropriate in prior applications for the annual standard may not be appropriate to use for the new 1-hour standard.

While these technical issues and considerations generally apply to both OLM and PVMRM, the importance of the in-stack NO_2/NOx ratios may be more important for PVMRM than for OLM in some cases, due to differences between the two methods. The key difference between the two methods is that the amount of ozone available for conversion of NO to NO_2 is based simply on the ambient ozone concentration and is independent of source characteristics for OLM, whereas the amount of ozone available for conversion in PVMRM is based on the amount of ozone within the volume of the plume for an individual source or group of sources. The plume volume used in PVMRM is calculated on an hourly basis for each source/receptor combination, taking into account the dispersive properties of the atmosphere for that hour. For a low-level release where peak hourly NOx impacts occur close to the source under stable/light wind conditions, the plume volume will be relatively small and the ambient NO_2 impact for such cases will be largely determined by the in-stack NO_2/NOx ratio, especially for sources with relatively close fenceline or ambient air boundaries. This example also highlights the fact that the relative importance of the in-stack NO_2/NOx ratios may be greater for some applications than others, depending on the source characteristics and other factors. Assumptions regarding in-stack NO_2/NOx ratios that may have been deemed appropriate in the context of the annual standard may not be appropriate to use for the new 1-hour standard. In particular, it is worth reiterating that the 0.1 in-stack ratio often cited as the "default" ratio for OLM should not be treated as a default value for hourly NO_2 compliance demonstrations.

Another difference between OLM and PVMRM that is worth noting here is the treatment of the titration mechanism for multiple sources of NOx. There are two possible modes that can be used for applying OLM to multiple source scenarios within AERMOD: (1) apply OLM to each source separately and assume that each source has all of the ambient ozone available for conversion of NO to NO_2; and (2) assume that sources whose plumes overlap compete for the available ozone and apply OLM on a combined plume basis. The latter option can be applied selectively to subsets of sources within the modeled inventory or to all modeled sources using the OLMGROUP keyword within AERMOD, and is likely to result in lower ambient NO_2 concentrations in most cases since the ambient NO_2 levels will be more ozone-limited. One of the potential refinements in application of the titration method incorporated in PVMRM is a technique for dynamically determining which sources should compete for the available ozone based on the relative locations of the plumes from individual sources, both laterally and vertically, on an hourly basis, taking into account wind direction and plume rise. While this approach addresses one of the implementation issues associated with OLM by making the decision of which sources should compete for ozone, there is only very limited field study data available to evaluate the methodology.

Given the importance of the issue of whether to combine plumes for the OLM option, EPA has addressed the issue in the past through the Model Clearinghouse process. The general guidance that has emerged in those cases is that the OLM option should be applied on a source-by-source basis in most cases and that combining plumes for application of OLM would require a clear demonstration that the plumes will overlap to such a degree that they can be considered as "merged" plumes. However, much of that guidance was provided in the context of applying the OLM method outside the dispersion model in a post-processing mode on an annual basis. The past guidance on this issue is still appropriate in that context since there is no realistic method to account for the degree of plume merging on an hourly basis throughout the modeling analysis when applied as a post-processor. However, the implementation of the OLM option within the AERMOD model applies the method on a source-by-source, receptor-by-receptor, and hour-by-hour basis. As a result, the application of the OLMGROUP option within AERMOD is such that the sources only compete for the available ozone to the extent that each source contributes to the cumulative NOx concentration at each receptor for that hour. Sources which contribute significantly to the ambient NOx concentration at the receptor will compete for available ozone in proportion to their contribution, while sources that do not contribute significantly to the ambient NOx concentration will not compete for the ozone. Thus, the OLMGROUP option implemented in AERMOD will tend to be "self-correcting" with respect to concerns that combining plumes for OLM will overestimate the degree of ozone limiting potential (and therefore underestimate ambient NO_2 concentrations). As a result of these considerations, we recommend that use of the "OLMGROUP ALL" option, which specifies that all sources will potentially compete for the available ozone, be routinely applied and accepted for all approved applications of the OLM option in AERMOD. This recommendation is supported by model-to-monitor comparisons of hourly NO_2 concentrations from the application of AERMOD for the Atlanta NO_2 risk and exposure assessment (EPA, 2008), and recent re-evaluations of hourly NO_2 impacts from the two field studies (New Mexico and Palaau) that were used in the evaluation of PVMRM (MACTEC, 2005). These model-to-monitor comparisons of hourly NO_2 concentrations show reasonably good performance using the "OLMGROUP ALL" option within AERMOD, with no indication of any bias to underestimate hourly NO_2 concentrations with OLMGROUP ALL. Furthermore, model-to-monitor comparisons based on OLM without the OLMGROUP option do exhibit a bias to overestimate hourly NO_2 concentrations. We will provide further details regarding these recent hourly NO_2 model-to-monitor comparisons at a later date.

SUMMARY

To summarize, we emphasize the following points:

1. The 3-tiered screening approach recommended in Section 5.2.4 of Appendix W for annual NO_2 assessments generally applies to the new 1-hour NO_2 standard.
2. While generally applicable, application of the 3-tiered screening approach for assessments of the new 1-hour NO_2 standard may entail additional considerations, such as the importance of key input data, including appropriate emission rates for the 1-hour standard vs. the annual standard for all tiers, and the representativeness of in-stack NO_2/NOx ratios and hourly background ozone concentrations for Tier 3 detailed screening methods.
3. Since the OLM and PVMRM methods in AERMOD are currently considered non-regulatory-default options, application of these options requires justification and approval by the Regional Office on a case-by-case basis as alternative modeling techniques, in accordance with Section 3.2.2, paragraph (e), of Appendix W.
4. Applications of the OLM option in AERMOD, subject to approval under Section 3.2.2.e of Appendix W, should routinely utilize the "OLMGROUP ALL" option for combining plumes.
5. While the 1-hour NAAQS for NO_2 is defined in terms of the 3-year average for monitored design values to determine attainment of the NAAQS, this definition does not preempt or alter the Appendix W requirement for use of 5 years of NWS meteorological data or at least 1 year of site specific data.

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ATTACHMENT A

Background on Hourly NOx Emissions for Permit Modeling for the 1-hour NO_2 NAAQS

Introduction

The purpose of this attachment is to address questions about availability of hourly NOx emissions for permit modeling under the new NO_2 NAAQS. It summarizes existing guidance regarding emission input data requirements for NAAQS compliance modeling, and provides background on the historical approach to development of inventories for NO_2 permit modeling and computation of hourly emissions appropriate for assessing the new 1-hour NO_2 standard. Although the NAAQS is defined in terms of ambient NO_2 concentrations, source emission estimates for modeling are based on NOx.

Under the PSD program, the owner or operator of the source is required to demonstrate that the source does not cause or contribute to a violation of a NAAQS (40 CFR 51.166 (k)(1) and 40 CFR 52.21 (k)(1)) and/or PSD increments (40 CFR 51.166 (k)(2) and 52.21 (k)(2)). However, estimation of the necessary emission input data for NAAQS compliance modeling entails consideration of numerous factors, and the appropriate reviewing authority should be consulted early in the process to determine the appropriate emissions data for use in specific modeling applications (see 40 CFR 51, Appendix W, 8.1.1.b and 8.2.3.b)

Summary of Current Guidance

Section 8.1 of the *Guideline on Air Quality Models*, Appendix W to 40 CFR Part 51, provides recommendations regarding source emission input data needed to support dispersion modeling for NAAQS compliance demonstrations. Table 8-2 of Appendix W provides detailed guidance regarding the specific components of the emission input data, including the appropriate emission limits (pounds/MMBtu), operating level (MMBtu/hr), and operating factor (e.g., hr/yr or hr/day), depending on the averaging time of the standard. Table 8-2 also distinguishes between the emission input data needed for the new or modified sources being assessed, and "nearby" and "other" background sources included in the modeled emission inventory.

Based on Table 8-2, emission input data for new or modified sources for annual and quarterly standards are essentially the same as for short-term standards ($\leq$ 24 hours), based on maximum allowable or federally enforceable emission limits, design capacity or federally enforceable permit conditions, and the assumption of continuous operation. However, there are a few additional considerations cited in Appendix W that could result in different emission input data for the 1-hour vs. annual NO_2 NAAQS. For example, while design capacity is listed as the recommended operating level for the emission calculation, peak hourly ground-level concentrations may be more sensitive than annual average concentrations to changes in stack parameters (effluent exit temperature and exit velocity) under different operating capacities. Table 8-2 specifically recommends modeling other operating levels, such as 50 percent or 75 percent of capacity, for short-term standards (see footnote 3). Another factor that may affect maximum ground-level concentrations differently between the 1-hour vs. annual standard is restrictions on operating factors based on federally enforceable permit conditions. While federally enforceable operating factors other than continuous operation may be accounted for in the emission input data (e.g., if operation is limited to 8 am to 4 pm each day), Appendix W also states that modeled emissions should not be averaged across non-operating time periods (see footnote 2 of Table 8-2).

While emission input data recommendations for "nearby" and "other" background sources included in the modeled emission inventory are similar to the new or modified source emission inputs in many respects, there is an important difference in the operating factor between annual and short-term standards. Emission input data for nearby and other sources may reflect actual operating factors (averaged over the most recent 2 years) for the annual standard, while continuous operation should be assumed for short-term standards. This could result in important differences in emission input data for modeled background sources for the 1-hour NO_2 NAAQS relative to emissions used for the annual standard.

Model Emission Inventory for NO_2 Modeling

For the existing annual NO_2 NAAQS, the permit modeling inventory has generally been compiled from the annual state emission inventory questionnaire (EIQ) or Title V permit applications on file with the relevant permitting authority (state or local air program). Since a state uses the annual EIQ for Title V fee assessment, the state EIQ typically requires reporting of unit capacity, total fuel combusted, and/or hours of operation to help verify annual emissions calculations for fee accuracy purposes. Likewise, Title V operating permit applications contain all of the same relevant information for calculating emissions. While these emission inventories are important resources for gathering emission input data on background sources for NAAQS compliance modeling, inventories which are based on actual operations may not be sufficient for short-term standards, such as the new 1-hour NO_2 NAAQS. However, appropriate estimates of emissions from background sources for the 1-hour NO_2 standard may be derived in many cases from information in these inventories regarding permitted emission limits and operating capacity.

Historically, it has not been a typical practice for an applicant to use the EPA's national emission inventory (NEI) as the primary source for compiling the permit modeling inventory. Since the emission data submitted to the NEI represents annual emission totals, it may not be suitable for use in NAAQS compliance modeling for short-term standards since modeling should be based on continuous operation, even for modeled background sources. Although the NEI may provide emission data for background sources that are more appropriate for the annual NO_2 standard, the utility of the NEI for purposes of NAAQS compliance modeling is further limited due to the fact that additional information regarding stack parameters and operating rates required for modeling may not be available from the NEI. While records exist in the NEI for reporting stack data necessary for point source modeling (i.e., stack coordinates, stack heights, exit temperatures, exit velocities), some states do not report such information to the NEI, or there are may be errors in the location data submitted to the NEI. Under such conditions, default stack information based upon SIC is substituted and use of such data could invalidate modeling results. Building locations and dimensions, which may be required to account for building downwash influences in the modeling analysis, may also be missing or incomplete in many cases.

A common and relatively straightforward approach for compiling the necessary information to develop an inventory of emissions from background sources for a permit modeling demonstration is as follows, patterned after the draft *New Source Review Workshop Manual* (EPA, 1990). The applicant completes initial modeling of allowable emission increases associated with the proposed project and determines the radii of impact (ROI) for each pollutant and averaging period, based on the maximum distance at which the modeled ambient concentration exceeds the Significant Impact Level (SIL) for each pollutant and averaging period. Typically, the largest ROI is selected and then a list of potential background sources within the ROI plus a screening distance beyond the ROI is compiled by the permitting authority and supplied to the applicant. The applicant typically requests permit applications or EIQ submittals from the records department of the permitting authority to gather stack data and source operating data necessary to compute emissions for the modeled inventory. Once the applicant has gathered the relevant data from the permitting authorities, model emission rates are calculated. While this approach is fairly common, it should be noted that the draft workshop manual "is not intended to be an official statement of policy and standards and does not establish binding regulatory requirements" (see, Preface), and the appropriate reviewing authority should be consulted early in the process regarding the selection of appropriate background source emission inventories for the 1-hour NO_2 standard. We also note that Appendix W establishes "a significant concentration gradient in the vicinity of the source" under consideration as the main criterion for selection of nearby sources for inclusion in the modeled inventory, and further indicates that "the number of such [nearby] sources is expected to be small except in unusual situations." See Section 8.2.3.b.

As mentioned previously, modeled emission rates for short-term NAAQS are computed consistent with the recommendations of Section 8.1 of Appendix W, summarized in Table 8-2. The maximum allowable (SIP-approved process weight rate limits) or federally enforceable permit limit emission rates assuming design capacity or federally enforceable capacity limitation are used to compute hourly emissions for dispersion modeling against short-term NAAQS such as the new 1-hour NO_2 NAAQS. If a source assumes an enforceable limit on the hourly firing capacity of a boiler, this is reflected in the calculations. Otherwise, the design capacity of the source is used to compute the model emission rate. A load analysis is typically necessary to determine the load or operating condition that causes the maximum ground-level concentrations. In addition to 100 percent load, loads such as 50 percent and 75 percent are commonly assessed. As noted above, the load analysis is generally more important for short-term standards than for annual standards. For an hourly standard, other operating scenarios of relatively short duration such as "startup" and "shutdown" should be assessed since these conditions may result in maximum hourly ground-level concentrations, and the control efficiency of emission control devices during these operating conditions may also need to be considered in the emission estimation.

Emission Calculation Example

The hourly emissions are most commonly computed from AP-42 emission factors based on unit design capacity. For a combustion unit, the source typically reports both the unit capacity and the actual total amount of fuel combusted annually (gallons, millions of cubic feet of gas, etc.) to the permitting authority for the EIQ. Likewise, Title V operating permit applications will contain similar information that can be used to compute hourly emissions.

For example, assume you are modeling an uncontrolled natural gas package boiler with a design firing rate of 30 MMBtu/hr. The AP-42 emission factor for an uncontrolled natural gas external combustion source (AP-42, Section 1.4) for firing rates less than 100 MMBtu/hr is 100 lbs. NOx/10^6 SCF natural gas combusted. The hourly emission rate is derived by converting the emission factor expressed in terms of lbs. NOx/10^6 SCF to lbs. NOx/MMBtu. The conversion is done by dividing the 100 lbs. NOx/10^6 SCF by 1,020 to convert the AP-42 factor to lbs. NOx/MMBtu. The new emission factor is now 0.098 lbs. NOx/MMBtu.

For this example, the source has no limit on the hourly firing rate of the boiler; therefore, the maximum hourly emissions are computed by multiplying the design firing rate of the boiler by the new emission factor.

$$E_{hourly} = 0.098 \text{ lbs/MMBtu} \times 30\text{MMBtu/hr} = 2.94 \text{ lbs/hr}$$

Thus 2.94 lbs/hr represents the emission rate that would be input into the dispersion model for modeling against the 1-hour NO_2 NAAQS to comport with emission rate recommendations of Section 8.1 of Appendix W.

It is important to note that data derived for the annual state emission inventory (EI) is based on actual levels of fuel combusted for the year, and is therefore different than how allowable emissions are computed for near-field dispersion modeling. For the annual EI report, a source computes their annual emissions based upon the AP-42 emission factor multiplied by the actual total annual throughput or total fuel combusted.

In the 30 MMBtu/hr boiler example, the annual NOx emissions reported to the NEI is computed by:

$$E_{annual} = (\text{AP-42 emission factor}) \times (\text{total annual fuel combusted})$$

$$E_{annual} = (100 \text{ lbs}/10^6 \text{ SCF}) \times (100\ 10^6 \text{ SCF/yr}) = 10{,}000 \text{ lbs. NOx/yr or } 5 \text{ tons NOx/yr}$$

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

AUG 23 2010

MEMORANDUM

SUBJECT: Guidance Concerning the Implementation of the 1-hour SO_2 NAAQS for the Prevention of Significant Deterioration Program

FROM: Stephen D. Page, Director
Office of Air Quality Planning and Standards

TO: Regional Air Division Directors

On June 2, 2010, the U.S. Environmental Protection Agency (EPA) announced a new 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standard (hereinafter, either the 1-hour SO_2 NAAQS or 1-hour SO_2 standard) of 75 ppb, which is attained when the 3-year average of the annual 99th-percentile of 1-hour daily maximum concentrations does not exceed 75 ppb at each monitor within an area. EPA revised the primary SO_2 NAAQS to provide the requisite protection of public health. The final rule for the new 1-hour SO_2 NAAQS was published in the Federal Register on June 22, 2010 (75 FR 35520), and the standard becomes effective on August 23, 2010. In the same notice, we also announced that we are revoking both the existing 24-hour and annual primary SO_2 standards. However, as explained in this guidance, those SO_2 standards, as well as the 24-hour and annual increments for SO_2, remain in effect for a while further and must continue to be protected.

EPA interprets the Prevention of Significant Deterioration (PSD) provisions of the Clean Air Act and EPA regulations to require that any federal permit issued under 40 CFR 52.21 on or after that effective date must contain a demonstration of source compliance with the new 1-hour SO_2 NAAQS. We anticipate that some new major stationary sources or major modifications, especially those involving relatively short stacks, may experience difficulty demonstrating that emissions from proposed projects will not cause or contribute to a modeled violation of the new 1-hour SO_2 NAAQS. We also anticipate problems that sources may have interpreting the modeled 1-hour SO_2 impacts if the form of the hourly standard is not properly addressed. To respond to these and other related issues, we are providing the attached guidance, in the form of two memoranda, for implementing the new 1-hour SO_2 NAAQS under the PSD permit program.

The first memorandum, titled "General Guidance for Implementing the 1-hour SO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour SO_2 Significant Impact Level," includes guidance for the preparation and review of PSD permits with respect to the new 1-hour SO_2 standard. That guidance memorandum sets forth a recommended interim 1-hour SO_2 significant impact level (SIL) that states may consider for carrying out the required PSD air quality analysis for SO_2, until EPA promulgates a 1-hour SO_2 SIL via rulemaking, and addresses the continued use of the existing SO_2 Significant Emissions Rate (SER) and Significant Monitoring Concentration (SMC) to implement the new 1-hour SO_2 standard.. The second memorandum, titled "Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard," includes specific modeling guidance for estimating ambient SO_2 concentrations and determining compliance with the new 1-hour SO_2 standard.

This guidance does not bind state and local governments and permit applicants as a matter of law. Nevertheless, we believe that state and local air agencies and industry will find this guidance useful for carrying out the PSD permit process and it will provide a consistent approach for estimating SO_2 air quality impacts from proposed construction or modification of SO_2 emissions sources. For the most part, the attached guidance focuses on how existing policy and guidance is relevant to and should be used for implementing the new 1-hour SO_2 NAAQS.

Please review the guidance included in the two attached memoranda. In the event of questions regarding the general implementation guidance contained in the first memorandum, please contact Raj Rao (rao.raj@epa.gov). For questions pertaining to the modeling guidance in the second memorandum, please contact Tyler Fox (fox.tyler@epa.gov). We are continuing our efforts to address permitting issues related to the implementation of new and revised NAAQS, and will issue additional guidance to address the NAAQS as appropriate.

Attachments:

1. Memorandum from Anna Marie Wood, Air Quality Policy Division, to EPA Regional Air Division Directors, "General Guidance for Implementing the 1-hour SO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour SO_2 Significant Impact Level" (August 23, 2010).
2. Memorandum from Tyler Fox, Air Quality Modeling Group, to EPA Regional Air Division Directors, "Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard" (August 23, 2010).

cc: Anna Marie Wood
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Rich Ossias
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

August 23, 2010

MEMORANDUM

SUBJECT: General Guidance for Implementing the 1-hour SO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour SO_2 Significant Impact Level

FROM: Anna Marie Wood, Acting Director /s/
Air Quality Policy Division

TO: Regional Air Division Directors

INTRODUCTION

We are issuing the following guidance to explain and clarify the procedures that may be followed by applicants for Prevention of Significant Deterioration (PSD) permits, and permitting authorities reviewing such applications, to properly demonstrate that proposed projects to construct and operate will not cause or contribute to a modeled violation of the new 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standard (hereinafter, either the 1-hour SO_2 NAAQS or 1-hour SO_2 standard) that becomes effective on August 23, 2010. The EPA revised the primary SO_2 NAAQS by promulgating a 1-hour SO_2 NAAQS to provide the requisite protection of public health. Under section 165(a)(3) of the Clean Air Act (the Act) and sections 52.21(k) and 51.166(k) of EPA's PSD regulations, to obtain a permit, a source must demonstrate that its proposed emissions increase will not cause or contribute to a violation of "any NAAQS."

This guidance is intended to (1) highlight the importance of a 1-hour averaging period for setting an emissions limitation for SO_2 in the PSD permit (2) reduce the modeling burden to implement the 1-hour SO_2 standard where it can be properly demonstrated that a source will not have a significant impact on ambient 1-hour SO_2 concentrations, and (3) identify approaches that allow sources and permitting authorities to mitigate, in a manner consistent with existing regulatory requirements, potential modeled violations of the 1-hour SO_2 NAAQS, where appropriate. Accordingly, the techniques described in this memorandum may be used by permit applicants and permitting authorities to perform an acceptable 1-hour SO_2 NAAQS compliance modeling assessment and/or properly configure projects and permit conditions in order that a proposed source's emissions do not cause or contribute to modeled 1-hour SO_2 NAAQS violations, so that permits can be issued in accordance with the applicable PSD program requirements.

This guidance discusses existing provisions in EPA regulations and guidance, and focuses on the relevancy of this information for implementing the new NAAQS for SO_2. Importantly, however, this guidance also sets forth a recommended interim 1-hour SO_2 significant impact level (SIL) that EPA will use when it evaluates applications and issues permits under the federal PSD program, and that states may choose to rely upon to implement their PSD programs for SO_2 if they agree that the value represents a reasonable threshold for determining a significant ambient impact, and they incorporate into each permit record a rationale supporting this conclusion. This interim SIL is a useful screening tool that can be used to determine whether or not the predicted ambient impacts caused by a proposed source's emissions increase will be significant and, if so whether the source's emissions should be considered to "cause or contribute to" modeled violations of the new 1-hour SO_2 NAAQS.

BACKGROUND

On August 23, 2010, the new 1-hour SO_2 NAAQS will become effective. Regulations at 40 CFR 52.21 (the federal PSD program) require permit applicants to demonstrate compliance with "any" NAAQS that is in effect on the date a PSD permit is issued. (See, e.g., EPA memo dated April 1, 2010, titled "Applicability of the Federal Prevention of Significant Deterioration Permit Requirements to New and Revised National Ambient Air Quality Standards.") Due to the promulgation of this short-term averaging period (1-hour) for the SO_2 NAAQS, we anticipate that some new major stationary sources or major modifications, especially those involving relatively short stacks may experience increased difficulty demonstrating that emissions from proposed project will not cause or contribute to a modeled violation.

We believe that, in some instances, preliminary predictions of violations could result from the use of maximum modeled concentrations that do not adequately take into account the form of the 1-hour standard. To the extent that is the case, ambient SO_2 concentrations in the form of the new 1-hour NAAQS should be estimated by applying the recommended procedures that account for the statistical form of the standard. See EPA Memorandum from Tyler Fox, Air Quality Modeling Group, to EPA Regional Air Division Directors, "Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard" (August 23, 2010) for specific modeling guidance for estimating ambient SO_2 concentrations consistent with the new 1-hour SO_2 NAAQS.

It is EPA's expectation that currently available SO_2 guidance, including the guidance presented in this memorandum, will assist in resolving some of the issues arising from preliminary analyses that show potential exceedances of the new 1-hour SO_2 NAAQS that would not be present under more refined modeling applications. In addition, the techniques described in this memorandum may also help avoid violations of the standard through design of the proposed source or permit conditions, consistent with existing regulatory requirements. Moreover, the interim 1-hour SO_2 SIL that is included in this guidance will provide a reasonable screening tool for effectively implementing the PSD requirements for an air quality impact analysis.

The following discussion provides guidance for establishing a 1-hour emissions limitation to demonstrate compliance with the new NAAQS, and for possibly mitigating modeled violations using any of the following: air quality-based permit limits more stringent than what the Best Available Control Technology provisions may otherwise require, air quality offsets, "good engineering practice" (GEP) stack heights, and an interim 1-hour SO_2 SIL. The continued use of the existing SO_2 Significant Emissions Rate (SER) and Significant Monitoring Concentration (SMC) to implement the new 1-hour SO_2 standard is also discussed.

SCREENING VALUES

In the final rule establishing the 1-hour SO_2 standard, EPA discussed various implementation considerations for the PSD permitting program. 75 FR.35520 (June 22, 2010). That discussion included the following statements regarding particular screening values that have historically been used on a widespread basis to facilitate implementation of the PSD permitting program:

> We agree with the commenters that there may be a need for EPA to provide additional screening tools or to revise existing screening tools that are frequently used under the NSR/PSD program for reducing the burden of completing SO_2 ambient air impact analyses. These screening tools include the SILs, as mentioned by the commenter, but also include the SER for emissions of SO_2 and the SMC for SO_2. The existing screening tools apply to the periods used to define the existing NAAQS for SO_2, including the annual, 24-hour, and 3-hour averaging periods. EPA intends to evaluate the need for possible changes or additions to each of these useful screening tools for SO_2 due to the revision of the SO_2 NAAQS to provide for a 1-hour standard. We believe it is highly likely that in order to be most effective for implementing the new 1-hour averaging period for NSR purposes, new 1-hour screening values will be appropriate.

75 FR 35579. EPA intends to conduct an evaluation of these issues and submit our findings in the form of revised significance levels under notice and comment rulemaking if any revisions are deemed appropriate. In the interim, for the reasons provided below, we recommend the continued use of the existing SER for SO_2 emissions as well as an interim 1-hour SO_2 SIL that we are setting forth today for conducting air quality impact analyses for the 1-hour SO_2 NAAQS. As described in the section titled Introduction, EPA intends to implement the interim 1-hour SO_2 SIL contained herein under the federal PSD program and offers states the opportunity to use it in their PSD programs if they choose to do so. EPA is not addressing the significant monitoring concentration (SMC) for SO_2 in this memorandum; the existing SMC for SO_2, at 40 CFR 52.21(i)(5)(i) should continue to be used.

SIGNIFICANT EMISSIONS RATE

The PSD regulations define SER for various regulated NSR pollutants. When a proposed new source's potential to emit a pollutant, or a modified source's net emissions increase of a pollutant, would be less than the SER, the source is not required to undergo the requisite PSD analyses (BACT and air quality) for that particular emissions increase. Under the terms of existing EPA regulations, the applicable SER for SO_2 is 40 tons per year (tpy). 40 CFR 52.21(b)(23); 40 CFR 51.166(b)(23). Each of the significant emissions rates defined in those regulations is specific to an individual pollutant with no differentiation by averaging time with regard to NAAQS. The NAAQS for SO_2 have included standards with 3-hour and 24-hour and annual averaging times for many years. The EPA has applied the 40 tpy SER for SO_2 across all of these averaging times, and we are aware of no reason why it should not be used for the 1-hour averaging period for the present time. Therefore, until the evaluation described above and any associated rulemaking are completed, we will use 40 tpy as the SER for the 1-hour standard.

Under existing regulations, an ambient air quality impact analysis is required for "each pollutant that [a source] would have the potential to emit in significant amounts." [40 CFR 52.21(m)(1)(i)(a); 40 CFR. 51.166(m)(1)(i)(a)]. For modifications, these regulations require this analysis for "each pollutant for which [the modification] would result in a significant net emissions increase." 40 CFR.52.21(m)(1)(i)(b); 40 CFR.51.166(m)(1)(i)(b). EPA construes this regulation to mean that an ambient impact analysis is not necessary for pollutants with emissions rates below the significant emissions rates in paragraph (b)(23) of the regulations. No additional action by EPA or permitting authorities is necessary at this time to apply the 40 tpy significant emissions rate in existing regulations to the hourly SO_2 standard.

INTERIM 1-HOUR SO_2 SIGNIFICANT IMPACT LEVEL

Under the PSD program, a proposed new major stationary source or major modification must, among other things, complete an air quality impact analysis that involves performing an analysis of air quality modeling and ambient monitoring data, where appropriate, to demonstrate compliance with applicable NAAQS. In order to implement this requirement, EPA traditionally has provided a screening tool known as the Significant Impact Level (SIL) to help applicants and permitting authorities determine whether a source's modeled ambient impact is significant so as to warrant a comprehensive, cumulative air quality analysis to demonstrate compliance with the NAAQS. Accordingly, where a proposed source's modeled impact is deemed insignificant, or *de minimis*, using the SIL as a threshold for significance, the applicant is not required to model anything besides its own proposed emissions increase to show that the proposed source or modification will not cause or contribute to a violation of the NAAQS.[1]

If, on the other hand, the source's modeled impact is found to be significant, based on the SIL, the applicant will need to complete a comprehensive, cumulative air quality impact analysis to demonstrate that the source's emissions will not cause or contribute to a modeled violation of any NAAQS. To make this demonstration, EPA has recommended that a cumulative analysis cover a circular area measuring out from the source to the maximum distance where the source's impact is equal to the SIL. Within this modeling area, the source should also model the impacts of other sources (existing and newly permitted), including applicable SO_2 sources located outside the circular area described above, to account for the cumulative hourly SO_2 air quality impacts

[1] When a proposed source's impact by itself is not considered to be "significant," EPA has long maintained that any further effort on the part of the applicant to complete a cumulative source impact analysis involving other source impacts would only yield information of trivial or no value with respect to the required evaluation of the proposed source or modification. The concept of a SIL is grounded on the *de minimis* principles described by the court in *Alabama Power Co. v. Costle*, 636 F.2d 323, 360 (D.C. Cir. 1980); See also *Sur Contra La Contaminacion v. EPA*, 202 F.3d 443, 448-49 (1st Cir. 2000) (upholding EPA's use of SIL to allow permit applicant to avoid full impact analysis); *In re: Prairie State Gen. Co.*, PSD Appeal No. 05-05, Slip. Op. at 139 (EAB 2006).

that are predicted to occur. The applicant may also have to gather ambient monitoring data as part of the total air quality analysis that is required for demonstrating compliance with the NAAQS.[2] Accordingly, the source will evaluate its contribution to any modeled violation of the 1-hour SO_2 NAAQS to determine whether the source's emissions contribution will cause or contribute to the modeled violation at any receptor. Note that in the accompanying modeling guidance memorandum we are providing recommended procedures and guidance for completing the modeling analysis to demonstrate compliance with the new 1-hour SO_2 NAAQS.

We plan to undertake rulemaking to adopt a 1-hour SO_2 SIL value. However, until such time as a 1-hour SO_2 SIL is defined in the PSD regulations, we are providing an interim SIL of 3 ppb, which we intend to use as a screening tool for completing the required air quality analyses for the new 1-hour SO_2 NAAQS under the federal PSD program at 40 CFR 52.21. We are also making the interim SIL available to States with EPA-approved implementation plans containing a PSD program to use at their discretion. To support the application of this interim 1-hour SO_2 SIL in each instance, a permitting authority that utilizes it as part of an ambient air quality analysis should include in the permit record the analysis reflected in this memorandum and the referenced documents to demonstrate that a modeled air quality impact is *de minimis*, and thereby would not be considered to cause or contribute to a modeled violation of the NAAQS.[3]

States may also elect to choose another value that they believe represents a significant air quality impact relative to the 1-hour SO_2 NAAQS. The EPA-recommended interim 1-hour SO_2 SIL is not intended to supersede any interim SIL that any state chooses to rely upon to implement a state PSD program that is part of an approved SIP, or to impose the use of the SIL concept on any state that chooses to implement the PSD program—in particular the ambient air quality analysis—without using a SIL as a screening tool. Accordingly, states that implement the PSD program under an EPA-approved SIP may choose to use this interim SIL, another value that may be deemed more appropriate for PSD permitting purposes in the state of concern, or no SIL at all. The application of any SIL that is not reflected in a promulgated regulation should be supported by a record in each instance that shows the value represents a *de minimis* impact on the 1-hour SO_2 standard, as described above.

As indicated above, using the interim 1-hour SO_2 SIL, the permit applicant and permitting authority can determine: (1) whether, based on the proposed increase in SO_2 emissions, a cumulative air quality analysis is required; (2) the area of impact within which a cumulative air quality analysis should focus; and (3) whether, as part of a cumulative air quality analysis, the proposed source's SO_2 emissions will cause or contribute to any modeled violation of the 1-hour SO_2 NAAQS.

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[2] A screening tool known as the Significant Monitoring Concentration (SMC) for SO_2 already exists in the PSD regulations. EPA plans to evaluate the existing SMC in light of the new 1-hour SO_2 NAAQS; however, the existing value of 13 $\mu g/m^3$, 24-hour average, should continue to be used until and unless a revised value is issued through rulemaking.

[3] Where the cumulative air quality analysis identifies a modeled violation of the NAAQS or increments, and the proposed source is issued its permit by virtue of the fact that its proposed emissions increase is not considered to cause or contribute to the modeled violation, it is still the permitting authority's responsibility to address such modeled violations independently from the PSD permitting process to determine the nature of the problem and to mitigate it accordingly.

As mentioned above, we are providing an interim 1-hour SO_2 SIL value of 3 ppb to implement the federal PSD program. To determine initially whether a proposed project's emissions increase will have a significant impact (resulting in the need for a cumulative air quality analysis), this interim SIL should be compared to either of the following:

- The highest of the 5-year averages of the maximum modeled 1-hour SO_2 concentrations predicted each year at each receptor, based on 5 years of National Weather Service data; or
- The highest modeled 1-hour SO_2 concentration predicted across all receptors based on 1 year of site-specific meteorological data, or the highest of the multi-year averages of the maximum modeled 1-hour SO_2 concentrations predicted each year at each receptor, based on 2 or more, up to 5 complete years of available site-specific meteorological data.

Additional guidance will be forthcoming for the purpose of comparing a proposed source's modeled impacts to the interim 1-hour SO_2 SIL in order to make a determination about whether that source's contribution is significant when a cumulative air quality analysis identifies violations of the 1-hour SO_2 NAAQS (i.e., "causes or contributes to" a modeled violation).

We derived this interim 1-hour SO_2 SIL by using an impact equal to 4% of the 1-hour SO_2 NAAQS (which is 75 ppb). On June 29, 2010, we issued an interim 1-hour NO_2 SIL that used an impact equal to 4% of the 1-hour NO_2 standard. As explained in the June memorandum, we have chosen this approach because we believe it is reasonable to base the interim 1-hour SIL directly on consideration of impacts relative to the corresponding 1-hour NAAQS. In 1980, we defined SER for each pollutant subject to PSD. 45 FR 52676 (August 7, 1980) at 52705-52710. For PM and SO_2, we defined the SER as the emissions rate that resulted in an ambient impact equal to 4% of the applicable short-term NAAQS. The 1980 analysis focused on levels no higher than 5% of the primary standard because of concerns that higher levels were found to result in unreasonably large amounts of increment being consumed by a single source. Within the range of impacts analyzed, we considered two factors that had an important influence on the choice of the significant impact levels: (1) cumulative effect on increment consumption of multiple sources in an area, each making the maximum *de minimis* emissions increase; and (2) the projected consequence of a given significant impact level on administrative burden. As explained in the preamble to the 1980 rulemaking and the supporting documentation,[4] EPA decided to use 4% of the 24-hour primary NAAQS for PM and SO_2 to define the significant emissions rates (SERs) for those pollutants. See 45 FR 52708. Looking now at a 1-hour NAAQS for SO_2, we believe that it is reasonable as an interim approach to use a SIL value that represents 4% of the 1-hour SO_2 NAAQS. EPA will consider other possible alternatives for developing a 1-hour SO_2 SIL in a future rulemaking that will provide an opportunity for public participation in the development of a SIL as part of the PSD regulations.

AIR-QUALITY BASED EMISSIONS LIMITATIONS

[4] EPA evaluated *de minimis* levels for pollutants for which NAAQS had been established in a document titled "Impact of Proposed and Alternative De Minimis Levels for Criteria Pollutants"; EPA-450/2-80-072, June 1980.

Once a level of control is determined by the PSD applicant via the Best Available Control Technology (BACT) top-down process, the applicant must model the proposed source's emissions at the BACT emissions rate(s) to demonstrate that those emissions will not cause or contribute to a violation of any NAAQS or PSD increment. However, the EPA 1990 Workshop Manual (page B.54) describes circumstances where a proposed source's emissions based on levels determined via the top-down process may not be sufficiently controlled to prevent modeled violations of an increment or NAAQS. In such cases, it may be appropriate for PSD applicants to propose a more stringent control option (that is, beyond the level identified via the top-down process) as a result of an adverse impact on the NAAQS or PSD increments. In addition, the use of certain dispersion techniques is permissible for certain proposed projects for SO_2 that may need to be considered where emissions limitations alone may not enable the source to demonstrate compliance with the new 1-hour SO_2 NAAQS. This is discussed in greater detail below in the section addressing GEP stack height requirements.

Because compliance with the new SO_2 NAAQS must be demonstrated on the basis of a 1-hour averaging period, the reviewing authority should ensure that the source's PSD permit defines a maximum allowable hourly emissions limitation for SO_2, regardless of whether it is derived from the BACT top-down approach or it is the result of an air-quality based emissions rate. Hourly limits are important because they are the foundation of the air quality modeling demonstration relative to the 1-hour SO_2 NAAQS. For estimating the impacts of existing sources, if necessary, existing SO_2 emission inventories used to support modeling for compliance with the 3-hour and 24-hour SO_2 standards should serve as a useful starting point, and may be adequate in many cases for use in assessing compliance with the new 1-hour SO_2 standard. The PSD applicant's coordination with the reviewing authority is important in this matter to obtain the most appropriate estimates of maximum allowable hourly SO_2 emissions.

DEMONSTRATING COMPLIANCE WITH THE NAAQS AND INCREMENTS & MITIGATING MODELED VIOLATIONS WITH AIR QUALITY OFFSETS

A 1988 EPA memorandum provides procedures to follow when a modeled violation is identified during the PSD permitting process. [See Memorandum from Gerald A. Emison , EPA OAQPS, to Thomas J. Maslany, EPA Air Management Division, "Air Quality Analysis for Prevention of Significant Deterioration (PSD)." (July 5, 1988.)] In cases where the air quality analysis predicts violations of the 1-hour SO_2 NAAQS, but the permit applicant can show that the SO_2 emissions increase from the proposed source will not have a significant impact *at the point and time of any modeled violation,* the permitting authority has discretion to conclude that the source's emissions will not contribute to the modeled violation. As provided in the July 5, 1988 guidance memo, because the proposed source only has a *de minimis* contribution to the modeled violation, the source's impact will not be considered to cause or contribute to such modeled violations, and the permit could be issued. This concept continues to apply, and the significant impact level (described further below) may be used as part of this analysis. A 2006 decision by the EPA Environmental Appeals Board (EAB) provides detailed reasoning that demonstrates the permissibility of a finding that a PSD source would not be considered to cause or contribute to a modeled NAAQS violation because its estimated air quality impact was insignificant at the time and place of the modeled violations.[5] [See In re *Prairie State Gen. Co.*, 13 E.A.D. ___, ___, PSD Appeal No. 05-05, Slip. Op. at 137-144 (EAB 2006)]

However, where it is determined that a source's impact does cause or contribute to a modeled violation, a permit cannot be issued without some action to mitigate the source's impact. In accordance with 40 CFR 51.165(b)[6], a major stationary source or major modification (as defined at §51.165(a)(1)(iv) and (v)) that locates in a SO_2 attainment area for the 1-hour SO_2 NAAQS and would cause or contribute to a violation of the 1-hour SO_2 NAAQS may "reduce the impact of its emissions upon air quality by obtaining sufficient emission reductions to, at a minimum, compensate for its adverse ambient [SO_2] impact where the major source or major modification would otherwise cause or contribute to a violation ...." An applicant can meet this requirement for obtaining additional emissions reductions either by reducing its emissions at the source (e.g., promoting more efficient production methodologies and energy efficiency) or by obtaining air quality offsets (see below). [See, e.g., In re *Interpower of New York, Inc.*, 5 E.A.D. 130, 141 (EAB 1994)].[7] A State may also provide the necessary emissions reductions by imposing emissions limitations on other sources through an approved SIP revision. These approaches may also be combined as necessary to demonstrate that a source will not cause or contribute to a violation of the NAAQS.

Unlike emissions offset requirements in areas designated as nonattainment, in addressing the air quality offset concept, it may not be necessary for a permit applicant to fully offset the proposed emissions increase if an emissions reduction of lesser quantity will mitigate the adverse air quality impact where the modeled violation was originally identified. ("Although full emission offsets are not required, such a source must obtain emission offsets sufficient to compensate for its air quality impact where the violation occurs." 44 FR 3274, January 16, 1979, at 3278.) To clarify this, the 1988 guidance memo referred to above states that:

> offsets sufficient to compensate for the source's significant impact must be obtained pursuant to an approved State offset program consistent with State Implementation Plan (SIP) requirements under 40 CFR 51.165(b). Where the source is contributing to an existing violation, the required offset may not correct the violation. Such existing violations must be addressed [through the SIP].

Note that additional guidance for this and other aspects of the modeling analysis for the impacts of SO_2 emissions on ambient concentrations of SO_2 are addressed in EPA modeling guidance, including the attached August 23, 2010 Memorandum titled "Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard."

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[5] While there is no 1-hour SO_2 significant impact level (SIL) currently defined in the PSD regulations, we believe that states may adopt interim values, with the appropriate justification for such values, to use for permitting purposes. In addition, we are recommending an interim SIL as part of this guidance for implementing the SO_2 requirements in the federal PSD program, and in state programs where states choose to use it.

[6] The same provision is contained in EPA's Interpretative Ruling at 40 CFR part 51 Appendix S, section III.

[7] In contrast to Nonattainment New Source Review permits, offsets are not mandatory requirements in PSD permits if it can otherwise be demonstrated that a source will not cause or contribute to a violation of the NAAQS. See, In re *Knauf Fiber Glass, GMBH*, 8 E.A.D. 121, 168 (EAB 1999).

Although EPA announced that it is revoking the annual and 24-hour SO_2 NAAQS, the June 22, 2010 preamble to the final rule announcing the new 1-hour SO_2 NAAQS explained that those standards will remain in effect for a limited period of time as follows: for current SO_2 nonattainment areas and SIP call areas, until attainment and maintenance SIPs are approved by EPA for the new 1-hour SO_2 NAAQS; for all other areas, for one year following the effective date of the initial designations under section 107(d)(1) for the new 1-hour SO_2 NAAQS. Accordingly, the annual and 24-hour SO_2 NAAQS must continue to be protected under the PSD program for as long as they remain in effect for a PSD area. There is a more detailed discussion of the transition from the existing SO_2 NAAQS to a revised SO_2 NAAQS in that preamble. Also, the same preamble includes a footnote listing the current nonattainment areas and SIP call areas. 75 FR 35520, at 35580-2.

In addition, the existing SO_2 increments (class I, II and III) for the annual and 24-hour averaging periods will not be revoked in conjunction with our decision to revoke the corresponding SO_2 NAAQS. Instead, the annual and 24-hour SO_2 increments (Class I, II and III increments) will remain in effect because they are defined in the Clean Air Act at title I, part C, section 163. The annual and 24-hour SO_2 increments in section 163 are considered part of the suite of statutory increments applicable to sulfur dioxide that Congress expressly included in the statutory provisions for PSD. As such, those increments cannot be revoked simply because we have decided to revoke the annual and 24-hour SO_2 NAAQS, upon which the SO_2 increments are based. Consequently, sources must continue to demonstrate that their proposed emissions increases of SO_2 emissions will not cause or contribute to any modeled violation of the existing annual and 24-hour SO_2 increments for as long as those statutory increments remain in effect. Increments for the 1-hour averaging period do not yet exist; the Act provides a specific schedule for the promulgation of additional regulations, which may include new increments, following the promulgation of new or revised NAAQS. EPA plans to begin that rulemaking process in the near future to consider the need for such increments.

"GOOD ENGINEERING PRACTICE" STACK HEIGHT AND DISPERSION TECHNIQUES

If a permit applicant is unable to show that the source's proposed emissions increase will not cause or contribute to a modeled violation of the new 1-hour SO_2 NAAQS, the problem could be the result of plume downwash effects causing high ambient concentrations near the source. In such cases, a source may be able to raise the height of its existing stacks (or designed stacks if not yet constructed) to a "good engineering practice" (GEP) stack height, or at least 65 meters, measured from the ground-level elevation at the base of the stack.

While not necessarily eliminating the full effect of downwash in all cases, raising stacks to GEP height may provide substantial air quality benefits in a manner consistent with statutory provisions (section 123 of the Act) governing acceptable stack heights to minimize excessive concentrations due to atmospheric downwash, eddies or wakes. Permit applicants should also be aware of the regulatory restrictions on stack heights for the purpose of modeling for compliance with NAAQS and increments. Section 52.21(h) of the PSD regulations currently prohibits the use of dispersion techniques, such as stack heights above GEP, merged gas streams, or intermittent controls for setting SO_2 emissions limits to meet the NAAQS and PSD increments.

However, stack heights in existence before December 31, 1970, and dispersion techniques implemented before then, are not affected by these limitations. EPA's general stack height regulations are promulgated at 40 CFR 51.100(ff), (gg), (hh), (ii), (jj), (kk) and (nn), and 40 CFR 51.118.

a. *Stack heights*: A source can include only the actual stack height up to GEP height when modeling to develop the SO_2 emissions limitations or to determine source compliance with the SO_2 NAAQS and increments. This is not a limit on the actual height of any stack constructed by a new source or modification, however, and there may be circumstances where a source owner elects to build a stack higher than GEP height. However, such additional height may not be considered when determining an emissions limitation or demonstrating compliance with an applicable NAAQS or PSD increment. Thus, when modeling, the following limitations apply in accordance with §52.21(h):

- For a stack height less than GEP, the actual stack height must be used in the source impact analysis for emissions;
- For a stack height equal to or greater than 65 meters the impact may be modeled using the greater of:
  - A *de minimis* stack height equal to 65 meters, as measured from the ground-level elevation at the base of the stack, without demonstration or calculation (40 CFR 51.100(ii)(1));
  - The refined formula height calculated using the dimensions of nearby structures in accordance with the following equation:

  GEP = H + 1.5L, where H is the height of the nearby structure and L is the lesser dimension of the height or projected width of the nearby structure (40 CFR 51.100(ii)(2)(ii)).[8]

- A GEP stack height exceeding the refined formula height may be approved when it can be demonstrated to be necessary to avoid "excessive concentrations" of SO_2 caused by atmospheric downwash, wakes, or eddy effects by the source, nearby structures, or nearby terrain features.
  (40 CFR 51.100(ii)(3), (jj), (kk));

- For purposes of PSD, "excessive concentrations" means a maximum ground-level concentration from a stack due in whole or in part to downwash, wakes, and eddy effects produced by nearby structures or nearby terrain features which individually is at least 40 percent in excess of the maximum concentration experienced in the absence of such effects and (a) which contributes to a total concentration due to emissions from all sources that is greater than the applicable NAAQS or (b) greater than the applicable PSD increments.
  (40 CFR 51.100(kk)(1)).

[8] For stacks in existence on January 12, 1979, the GEP equation is GEP = 2.5 H (provided the owner or operator produces evidence that this equation was actually relied on in establishing an emission limitation for SO_2 (40 CFR 51.100(ii)(2)(i)

Reportedly, for economic and other reasons, many existing source stacks have been constructed at heights less than 65 meters, and source impact analyses may show that the source's emissions will cause or contribute to a modeled violation of the 1-hour SO_2 NAAQS. Where this is the case, sources should be aware that it is permissible for them to increase their stack heights up to 65 meters without a GEP demonstration.

b. *Other dispersion techniques*: The term "dispersion technique" includes any practice carried out to increase final plume rise, subject to certain exceptions (40 CFR 51.100(hh)(1), (2)(i) – (v)). Beyond the noted exceptions, such techniques are not allowed for getting credit for modeling source compliance with the NAAQS and PSD increments. One such exception is for sources of SO_2. Section 51.100(hh)(2)(v) provides that identified techniques that increase final exhaust gas plume rise are not considered prohibited dispersion techniques pursuant to section 51.100(hh)(1)(iii) "where the resulting allowable emissions of sulfur dioxide from the facility do not exceed 5,000 tons per year." Thus, proposed modifications that experience difficulty modeling compliance with the new 1-hour SO_2 NAAQS when relying on BACT or an air quality-based emissions limit alone may permissibly consider techniques to increase their final exhaust gas plume rise consistent with these provisions.

The definition of "dispersion technique" at 40 CFR 51.100(hh)(1)(iii) describes techniques that are generally prohibited, but which do not apply with respect to the exemption for SO_2. Accordingly, it is permissible for eligible SO_2 sources to make adjustments to source process parameters, exhaust gas parameters, stack parameters, or to combine exhaust gases from several existing stacks into one stack, so as to increase the exhaust gas plume rise. It is important to remember that the exemption applies to sources that have facility-wide allowable SO_2 emissions of less than 5,000 tpy resulting from the increase in final exhaust gas plume rise. Thus, proposed modifications should not base their eligibility to use dispersion on the amount of the proposed net emissions increase, but on the total source emissions of SO_2.

The EPA does not recommend or encourage sources to rely on dispersion to demonstrate compliance with the NAAQS; however, we acknowledge the fact that certain SO_2 sources may legally do so. For example, while increasing stack height is a method of dispersion, EPA's rules allow use of that approach to the extent the resulting height meets EPA's requirements defining "good engineering practice (GEP)" stack height. See 40 CFR 50.100(hh)(1)(i), 50.100(ii)(1)-(3). Nevertheless, EPA encourages PSD applicants to seek other remedies, including the use of the most stringent controls (beyond top-down BACT) feasible or the acquisition of emissions reductions (offsets) from other existing sources, to address situations where proposed emissions increases would result in modeled violations of the SO_2 NAAQS.

GENERAL START-UP CONDITIONS

We do not anticipate widespread problems associated with high short-term SO_2 emissions resulting from start-up/shutdown conditions. Many sources are capable of starting a unit with natural gas or low-sulfur fuel to avoid significant start-up emissions problems. However, some sources could experience short-term peaks of SO_2 during start-up or shutdown that could adversely affect the new 1-hour SO_2 NAAQS. The EPA currently has no provisions for exempting emissions occurring during equipment start-up/shutdown from the BACT requirements or for air quality analyses to demonstrate compliance with the SO_2 NAAQS and increments. Therefore, such emissions should be addressed in the required BACT and air quality analyses.

There are approaches to addressing issues related to start-up/shutdown emissions. For example, sources may be willing to accept enforceable permit conditions limiting equipment start-up/shutdown to certain hours of the day when impacts are expected to be lower than normal. Such permit limitations can be accounted for in the modeling of such emissions. Applicants should direct other questions arising concerning procedures for modeling start-up/shutdown emissions to the applicable permitting authority to determine the most current modeling guidance.

In the event of questions regarding the general implementation guidance contained in this memorandum, please contact Raj Rao (rao.raj@epa.gov).

cc: Raj Rao, C504-01
Dan deRoeck, C504-03
Tyler Fox, C439-01
Roger Brode, C439-01
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EPA Regional NSR Contacts

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

August 23, 2010

MEMORANDUM

SUBJECT: Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard

FROM: Tyler Fox, Leader /s/
Air Quality Modeling Group, C439-01

TO: Regional Air Division Directors

INTRODUCTION

On June 2, 2010, EPA announced a new 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standard (1-hour SO_2 NAAQS or 1-hour SO_2 standard) which is attained when the 3-year average of the 99th-percentile of the annual distribution of daily maximum 1-hour concentrations does not exceed 75 ppb at each monitor within an area. The final rule for the new 1-hour SO_2 NAAQS was published in the Federal Register on June 22, 2010 (75 FR 35520-35603), and the standard becomes effective on August 23, 2010 (EPA, 2010a). This memorandum clarifies the applicability of current guidance in the *Guideline on Air Quality Models* (40 CFR Part 51, Appendix W) for modeling SO_2 impacts in accordance with the Prevention of Significant Deterioration (PSD) permit requirements to demonstrate compliance with the new 1-hour SO_2 standard.

SUMMARY OF CURRENT GUIDANCE

Current modeling guidance for estimating ambient impacts of SO_2 for comparison with applicable NAAQS is presented in Section 4 of Appendix W under the general heading of "Traditional Stationary Source Models." This guidance acknowledges the fact that ambient SO_2 impacts are largely a result of emissions from stationary sources. Section 4.2.2 provides specific recommendations regarding "Refined Analytical Techniques," stating that "For a wide range of regulatory applications in all types of terrain, the recommended model is AERMOD" (see Section 4.2.2.b). As described in Section 4.1.d, the AERMOD dispersion model "employs best state-of-practice parameterizations for characterizing the meteorological influences and dispersion" (Cimorelli, *et al.*, 2004; EPA, 2004; EPA, 2009).

Section 7.2.6 of Appendix W addresses the issue of chemical transformation for modeling SO_2 emissions, stating that:

The chemical transformation of SO_2 emitted from point sources or single industrial plants in rural areas is generally assumed to be relatively unimportant to the estimation of maximum concentrations when travel time is limited to a few hours. However, in urban areas, where synergistic effects among pollutants are of considerable consequence, chemical transformation rates may be of concern. In urban area applications, a half-life of 4 hours may be applied to the analysis of SO_2 emissions. Calculations of transformation coefficients from site specific studies can be used to define a ''half-life'' to be used in a steady-state Gaussian plume model with any travel time, or in any application, if appropriate documentation is provided. Such conversion factors for pollutant half-life should not be used with screening analyses.

The AERMOD model incorporates the 4 hour half-life for modeling ambient SO_2 concentrations in urban areas under the regulatory default option.

General guidance regarding source emission input data requirements for modeling ambient SO_2 impacts is provided in Section 8.1 of Appendix W and guidance regarding determination of background concentrations for purposes of a cumulative ambient air quality impact analysis is provided in Section 8.2.

APPLICABILITY OF CURRENT GUIDANCE TO 1-HOUR SO_2 NAAQS

The current guidance in Appendix W regarding SO_2 modeling in the context of the previous 24-hour and annual primary SO_2 NAAQS and the 3-hour secondary SO_2 NAAQS is generally applicable to the new 1-hour SO_2 standard. Since short-term SO_2 standards ($\leq$ 24 hours) have been in existence for decades, existing SO_2 emission inventories used to support modeling for compliance with the 3-hour and 24-hour SO_2 standards should serve as a useful starting point, and may be adequate in many cases for use in assessing compliance with the new 1-hour SO_2 standard, since issues identified in Table 8-2 of Appendix W related to short-term vs. long-term emission estimates may have already been addressed. However, the PSD applicant and reviewing authority may need to reassess emission estimates for very short-term emission scenarios, such as start-up and shut-down operations, for purposes of estimating source impacts on the 1-hour SO_2 standard. This is especially true if existing emission estimates for 3-hour or 24-hour periods are based on averages that include zero (0) or reduced emissions for some of the hours.

Given the form of the new 1-hour SO_2 standard, we are providing clarification regarding the appropriate data periods for modeling demonstrations of compliance with the NAAQS vs. demonstrations of attainment of the NAAQS through ambient monitoring. While monitored design values for the 1-hour SO_2 standard are based on a 3-year average (in accordance with Section 1(c) of Appendix T to 40 CFR Part 50), Section 8.3.1.2 of Appendix W addresses the length of the meteorological data record for dispersion modeling, stating that "[T]he use of 5 years of NWS [National Weather Service] meteorological data or at least 1 year of site specific data is required." Section 8.3.1.2.b further states that "one year or more (including partial years), up to five years, of site specific data . . . are preferred for use in air quality analyses." Although the monitored design value for the 1-hour SO_2 standard is defined in terms of the 3-year average, this definition does not preempt or alter the Appendix W requirement for use of 5 years of NWS meteorological data or at least 1 year of site specific data. The 5-year average based on use of NWS data, or an average across one or more years of available site specific data, serves as an unbiased estimate of the 3-year average for purposes of modeling demonstrations of compliance with the NAAQS. Modeling of "rolling 3-year averages," using years 1 through 3, years 2 through 4, and years 3 through 5, is not required. Furthermore, since modeled results for SO_2 are averaged across the number of years modeled for comparison to the new 1-hour SO_2 standard, the meteorological data period should include complete years of data to avoid introducing a seasonal bias to the averaged impacts. In order to comply with Appendix W recommendations in cases where partial years of site specific meteorological data are available, while avoiding any seasonal bias in the averaged impacts, an approach that utilizes the most conservative modeling result based on the first complete-year period of the available data record vs. results based on the last complete-year period of available data may be appropriate, subject to approval by the appropriate reviewing authority. Such an approach would ensure that all available site specific data are accounted for in the modeling analysis without imposing an undue burden on the applicant and avoiding arbitrary choices in the selection of a single complete-year data period.

The form of the new 1-hour SO_2 standard also has implications regarding appropriate methods for combining modeled ambient concentrations with monitored background concentrations for comparison to the NAAQS in a cumulative modeling analysis. As noted in the March 23, 2010 memorandum regarding "Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS" (EPA, 2010b), combining the 98^{th} percentile monitored value with the 98^{th} percentile modeled concentrations for a cumulative impact assessment could result in a value that is below the 98^{th} percentile of the combined cumulative distribution and would, therefore, not be protective of the NAAQS. However, unlike the recommendations presented for $PM_{2.5}$, the modeled contribution to the cumulative ambient impact assessment for the 1-hour SO_2 standard should follow the form of the standard based on the 99^{th} percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled. A "first tier" assumption that may be applied without further justification is to add the overall highest hourly background SO_2 concentration from a representative monitor to the modeled design value, based on the form of the standard, for comparison to the NAAQS. Additional refinements to this "first tier" approach based on some level of temporal pairing of modeled and monitored values may be considered on a case-by-case basis, subject to approval by the reviewing authority, with adequate justification and documentation.

Section 8.2.3 of Appendix W provides recommendations regarding the determination of background concentrations for multi-source areas. That section emphasizes the importance of professional judgment by the reviewing authority in the identification of nearby and other sources to be included in the modeled emission inventory, and establishes "a significant concentration gradient in the vicinity of the source" under consideration as the main criterion for this selection. Appendix W also indicates that "the number of such [nearby] sources is expected to be small except in unusual situations." See Section 8.2.3.b.

The representativeness of available ambient air quality data also plays an important role in determining which nearby sources should be included in the modeled emission inventory. Key issues to consider in this regard are the extent to which ambient air impacts of emissions from nearby sources are reflected in the available ambient measurements, and the degree to which emissions from those background sources during the monitoring period are representative of allowable emission levels under the existing permits. The professional judgments that are required in developing an appropriate inventory of background sources should strive toward the proper balance between adequately characterizing the potential for cumulative impacts of emission sources within the study area to cause or contribute to violations of the NAAQS, while minimizing the potential to overestimate impacts by double counting modeled source impacts that are also reflected in the ambient monitoring data.

We would also caution against the literal and uncritical application of very prescriptive procedures for identifying which background sources should be included in the modeled emission inventory for NAAQS compliance demonstrations, including those described in Chapter C, Section IV.C.1 of the draft *New Source Review Workshop Manual* (EPA, 1990), noting again that Appendix W emphasizes the importance of professional judgment in this process. While the draft workshop manual serves as a useful general reference that provides potential approaches for meeting the requirements of New Source Review (NSR) and PSD programs, it is not the only source of EPA modeling guidance. The procedures described in the manual may be appropriate in some circumstances for defining the spatial extent of sources whose emissions may need to be considered, but not in others. While the procedures described in the NSR Workshop Manual may appear very prescriptive, it should be recognized that "[i]t is not intended to be an official statement of policy and standards and does not establish binding regulatory requirements." See, Preface.

Given the range of issues involved in the determination of an appropriate inventory of emissions to include in a cumulative impact assessment, the PSD applicant should consult with the appropriate reviewing authority early in the process regarding the selection and proper application of appropriate monitored background concentrations and the selection and appropriate characterization of modeled background source emission inventories for use in demonstrating compliance with the new 1-hour SO_2 standard.

SUMMARY

To summarize, we emphasize the following points:

1. Current guidance in Appendix W for modeling to demonstrate compliance with the previous 24-hour and annual primary SO_2 standards, and 3-hour secondary SO_2 standard, is generally applicable for the new 1-hour SO_2 NAAQS.
2. While the 1-hour NAAQS for SO_2 is defined in terms of the 3-year average for monitored design values to determine attainment of the NAAQS, this definition does not preempt or alter the Appendix W requirement for use of 5 years of NWS meteorological data or at least 1 year of site specific data.

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ATTACHMENT 3

Division of Air Quality Final, Certified, West Virginia $PM_{2.5}$ Design Values

West Virginia PM2.5

Design Values

data final and certified through 12/31/2015

(NAAQS 24 hr 3 yr 98% = 35 ug/m³)

County	Site	02-04	03-05	04-06	05-07	06-08	07-09	08-10	09-11	10-12	11-13	12-14	13-15
Berkeley	Martinsburg	37	38	34	33	31	29	31	30	31	26	27	26
Brooke	Follansbee	44	42	40	37	37	34	31	27	27	26	24	25
	Weirton-Marl. Hgts	47	46	43	44	41	37	31	29	27	26	24	24
Cabell	Huntington	37	35	34	37	32	30	26	25	24	21	21	21
Hancock	Weirton-Summit Circle												22
	Weirton-Oak St.	44	41	40	41	38	35	31	28	27	26	23	
Harrison	Clarksburg	34	32	35	34	31	26	23	21	21	20	19	19
Kanawha	Charleston	34	34	35	36	34	29	25	24	23	21	18	18
	Guthrie			33	31								
	So. Charleston	38	36	37	38	38	32	28	26	24	22	20	20
Marion	Fairmont	38	34	34	34	32	28	26	26	26	22	19	19
Marshall	Moundsville	38	33	34	35	34	31	29	29	29	25	23	23
Mercer	Bluefield	32	33										
Monongalia	Morgantown	39	38	34	36	34	30	26	26	24	22	18	19
Ohio	Wheeling	35	32	31	32	31	29	26	26	25	24	22	23
Raleigh	Beckley	32	31	31	30	28	24	21	20	20	19	14	11
Summers	Keeney Knob	29	31										
Wood	Vienna	35	34	35	37	34	31	28	27	24	22	19	21

(Annual NAAQS <= 12.0 ug/m³)

County	Site	02-04	03-05	04-06	05-07	06-08	07-09	08-10	09-11	10-12	11-13	12-14	13-15
Berkeley	Martinsburg	16.1	16.2	15.8	15.8	14.9	14.0	12.9	11.8	11.6	10.7	10.4	10.3
Brooke	Follansbee	18.5	16.8	16.4	16.4	15.4	14.4	13.7	13.0	12.7	11.5	11.1	11.2
	Weirton-Marl. Hgts	15.8	16.4	15.7	16.1	14.9	14.0	13.1	11.6	11.1	10.1	10.4	10.3
Cabell	Huntington	18.8	16.3	16.1	16.5	15.2	14.3	13.1	12.1	11.6	10.4	9.8	9.2
Hancock	Weirton-Summit Circle												9.7
	Weirton-Oak St.	17.0	16.8	16.4	15.2	14.3	13.4	12.4	11.7	11.3	10.5	10.0	10.0
Harrison	Clarksburg	13.8	13.9	13.9	14.2	13.4	12.6	11.8	10.8	10.2	9.2	9.1	8.8
Kanawha	Charleston	14.8	15.1	15.0	16.4	14.2	13.1	11.8	11.0	10.7	9.7	9.1	8.6
	Guthrie			13.2	12.2								
	So. Charleston	16.4	16.8	16.4	16.6	15.4	14.4	13.2	12.5	11.9	10.8	10.2	9.6
Marion	Fairmont	14.8	15.0	14.9	15.3	14.5	13.6	12.9	12.1	11.6	10.3	9.7	9.4
Marshall	Moundsville	15.1	15.3	15.0	15.2	14.2	13.4	13.1	13.0	12.8	11.6	11.1	10.7
Mercer	Bluefield	12.1	12.8										
Monongalia	Morgantown	14.5	14.5	14.1	14.4	13.6	12.7	11.6	10.9	10.3	9.5	8.8	8.8
Ohio	Wheeling	14.7	14.9	14.2	14.6	13.7	13.2	12.4	11.5	11.6	10.6	10.4	10.5
Raleigh	Beckley	12.6	12.9	12.8	13.0	11.9	11.8	10.1	9.6	9.3	8.3	8.6	8.9
Summers	Keeney Knob	9.8	10.6										
Wood	Vienna	15.2	15.4	15.3	15.4	14.6	13.7	13.1	12.3	11.8	10.4	9.8	9.4

* Summit Circle sampling started 1/1/2015; therefore 3 yr 98% not complete

Oak Street's site shut-down 12/31/2014

ATTACHMENT 4

EPA Region 3 Alternative Model Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

The Honorable Randy C. Huffman, Secretary
West Virginia Department of Environmental Protection
601 57th Street, S.E.
Charleston, West Virginia 25304

APR 0 8 2016

Dear Secretary ~~Huffman~~: Randy

Thank you for your letter dated March 17, 2016 regarding your request to use an alternative model protocol in support of a Prevention of Significant Deterioration (PSD) permit application submitted to the West Virginia Department of Environment Protection (WVDEP). Pleasants Energy, LLC (Pleasants Energy) is proposing a modification to its Pleasants Energy facility located near Waverly in Pleasants County, West Virginia. The facility consists of two simple-cycle General Electric (GE) 7FA combustion turbines. The facility's original permit restricted emissions to less than 250 tons per year (tpy) for any criteria pollutant. This modification will remove these operational restrictions.

As you described in your letter, a proposed modification for Pleasants Energy's PSD permit application is currently under review by the WVDEP. A modeling analysis to demonstrate compliance with the 1-hour NO_2 National Ambient Air Quality Standard (NAAQS) was included as part of this application. The applicant submitted modeling that uses a nonguideline option, the Ozone Limiting Method (OLM), in the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) dispersion model. The use of OLM in AERMOD requires an approval from the Regional Administrator under Section 3.2.2 (a) of Appendix W of 40 Code of Federal Regulations (CFR) Part 51 - Guideline on Air Quality Models.

Approval of the use of OLM is contingent on meeting the five (5) conditions outlined in Section 3.2.2 (e) of 40 CFR Part 51, Appendix W. These include:

i. The model has received a scientific peer review;
ii. The model can be demonstrated to be applicable to the problem on a theoretical basis;
iii. The data bases which are necessary to perform the analysis are available and adequate;
iv. Appropriate performance evaluations of the model have shown that the model is not biased toward underestimates;
v. A protocol on methods and procedures to be followed has been established.

We have reviewed your submission outlined in your March 17th letter and the modeling protocol approved by WVDEP. We have determined that they have met the requirements outlined in Section 3.2.2 (e) of Appendix W, Guideline on Air Quality Models and therefore we formally grant approval to use OLM in the modeling analysis for the Pleasants Energy project.

If you have any questions, please do not hesitate to contact me or have your staff contact Mr. Mark Ferrell, EPA's West Virginia Liaison, at (304) 542-0231. For questions regarding this approval action, your staff may contact Mr. Nikos Singelis, Acting Director, Air Protection Division, at (215) 814-2132.

Sincerely,

Shawn M. Garvin
Regional Administrator

cc: Mr. William F. Durham, WVDEP

MEMO

To: Steve Pursley
From: Jon McClung JDM
CC: Laura Crowder, Bev McKeone, Ed Andrews, Joe Kessler, Steve Pursley, Fadi Qutaish
Date: December 16, 2016
Re: Pleasants Energy, LLC Modeling Review - PSD Application R14-0034
Supplemental Air Dispersion Modeling for Diesel (Blackstart) Generators

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On September 19, 2016, I issued a memorandum detailing my review of the air dispersion modeling analysis submitted in support of the PSD permit application (R14-0034) for the proposed modification of the Pleasants Energy, LLC (Pleasants Energy) facility located near Waverly, Pleasants County, West Virginia. This dispersion modeling analysis considered a number of different operating scenarios. Subsequent to finalizing this memorandum, Pleasants Energy discovered that a desired scenario was not modeled and therefore they prepared a supplemental modeling analysis based on this additional scenario. The additional desired scenario is blackstart operation for all five diesel generators operating simultaneously to startup the combustion turbines at the Pleasants Energy facility. Attached is the supplemental modeling summary submitted by Pleasants Energy.

I have completed my review and replication of the supplemental air dispersion modeling analysis. This supplemental scenario consists of all five diesel blackstart generators operating simultaneously for four hours out of a 24-hour period. The modeling was performed for this operating scenario for all hours of the entire meteorological record. This scenario is expected in rare circumstances and therefore, consistent with EPA's intermittant emissions guidance, modeling was not performed for 1-hr NO_2, since this scenario would not occur frequently enough to contribute to potential exceedances of the percentile based standard. Air dispersion modeling for the blackstart scenario was performed for 24-hr $PM_{2.5}$.

The supplemental modeling analysis for the blackstart scenario used the same model, meterological data, and analysis procedures as the analysis detailed in my September 19, 2016 memorandum. Modeled exeedances of the NAAQS and increment are predicted for 24-hr $PM_{2.5}$. However, Pleasants Energy does not significantly cause or contribute to the predicted exeedances of the NAAQS or the increment. As in the original modeling analysis, Pleasants Energy conservatively used the NAAQS source inventory as the increment consuming inventory. Any modeled increment exceedances are likely to be siginificantly overpredicted since there are likely sources conservatively included in the increment consuming source inventory that do not consume increment.